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Economic Shocks and Coping Strategies: Evidence from Bangladesh

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Abstract

Households move strategically to smooth consumption in the event of economic shocks. This paper comprehensively analyzes various coping schemes adopted by households in the event of different types and intensity of economic shocks. We conclusively find that erosive coping is a dominant strategy for households for all types of shocks except for the case of asset shocks. It is also evident that the higher the total loss suffered, the greater is the likelihood of adopting erosive coping schemes for any of the three economic shocks. Contrary to the findings related to asset shocks, the household is highly likely to adopt erosive savings and help from relatives in case of economic shocks. In addition to these two methods, households also mortgage land or take up new loans when it encounters expenditure shocks. The households is more prone to adopt multiple strategies in case of income and expenditure shocks.

Key Words: Coping Strategies, Economics Shocks, Erosive Coping

Economic Shocks and Coping Strategies: Evidence from Bangladesh

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1. Introduction

This paper addresses vulnerability to poverty and coping mechanisms of Bangladeshi households using a unique panel dataset surveying around 8300 households in 2010 and 2014. The relationship between poverty and vulnerability in the developing world has been a topic of interest and debate among academics and policy makers. Households in developing countries face different types of shocks from vagaries of nature, uncertainities of the market, complete market failure or individual calamities. Some shocks are particular to one household only. These are called idiosyncratic shocks. Again, some shocks, like natural disasters affect the entire village, a community, or a trade or an occupational group. These are referred to as systematic shocks. These shocks have short run and long run consequences. Households plan strategically to smooth consumption in the event of income shocks and the set of coping strategies adopted by the households depend on a number of factors, especially, the types of crisis the households face and opportunities available to them. How effectively the vulnerable households cope has important implictions for the poverty dynamics of the country.

Providing insurance to rural population in developing countries is quite problematic because of asymmetric information and high transactions costs. Like formal credit markets in poor regions, insurance markets are characterized by high transactions costs, moral hazard, adverse selection, limited cash flows, low education levels of clients, and weak enforcement mechanisms. Recently in Bangladesh, microfinance organizations are playing an important role to fill this vacuity by providing micro-insurance to their clients. Morduch (2004) believed micro-insurance is going to be as successful as microcredit in the fight against poverty. There has been a revolution in Bangladesh in terms of access to credit for the poor through the operations of various microfinance institutes. Extensive research has been done evaluating the impact of microcredit in overall well being of the households and a significant number of studies investigated the role of microcredit in coping with incomes shocks.

Using a new nationally representative panel data from Bangladesh, the broad objective of this paper is to identify different coping mechanisms adopted by affected households in presence of a very thin insurance market and differential access to formal and informal credit markets.

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The distinctiveness of the current study stems from the fact that it is quite comprehensive in nature in terms of classification of shocks and coping schemes. In addition to the three fold economic classification of shocks, namely, income, asset and expenditure; besides the two fold classification of coping mechanisms, namely erosive and non-erosive, following the novel conceptual framework put forward in Osmani et al (2013), this study tries to shed light on the intensity of the shocks faced by the households, regardless of the nature of the shocks. We also tried to analyze the determinants of the most frequently occuring shocks and most commonly adopted strategies.

2. Literature Review

Natural disasters affect the consumption pattern of households before and after the event. Forward looking households in an effort to adopt risk mitigating techniques, incur ex-ante costs. Households also bear ex-post costs in coping with the aftermath of natural disasters. Examples of such costs according to literature, include loss of uninsured assets, reduction in current consumption, liquidation of assets, interest paid on loans from formal and informal sectors and the loss of human capital for the future generation.

The topic of risk coping and efficiency of the household has been extensively researched. In this section we try to provide a review of some of the most recent and relevant research pieces which is far from being exhaustive; rather emphasizes the special research focus of this chapter. First, we try to present the various coping mechanisms adopted by households for consumption smoothing purposes in the event of an income shock as seen in literature pertaining to the developing countries. In the absence of formal insurance, and availability of credit, households resort to various behavioral responses and also some informal arrangements.

Corbett (1988) classified the coping techniques into two broad categories: precautionary and crisis strategies. Precautionary strategies are adopted in the wake of repeated exposure to similar type of non-acute risks. In contrast, severe threat to food-security forces households to resort to crisis strategies. In a similar study, Dunn and Valdivia (1996) find that in the Andean semi-arid regions, wealthier households own more assets in the form of livestock, and therefore, are in comparatively advantageous positions to adjust or mitigate the shocks ex-post; hence are less likely to adopt ex-ante risk reducing strategies.

The most prominent Ex-Ante strategy adopted by households is to invest in different income sources. As long as the sources of income do not co-vary perfectly, risks to total income are reduced. Alderman and Paxson (1992) noted in their paper that crop and field diversification, mix of farm and non farm occupations are quite wide spread in the rural areas of developing countries. Morduch (1995) in his review paper lists similar findings. Variability reducing inputs and production techniques are often favored by households to smooth income. Households facing higher farm profit volatility send members abroad for steady income flow. Rosenzweig and Binswanger (1993) found that in India poorer farmers are more risk averse in the sense that they adopt less risky production strategies. Farmers facing unpredictable environment, select the blend of assets which are less sensitive to rainfall and generate low profit levels.

Rosenzweig (1988) and Urdy (1994) have found that households in the developing world traditionally rely on social networks of extended family, friends and neighbors and other informal institutions to mitigate the effect of the shock as Ex Post strategies. They manage only partially to insure against shocks by engaging in informal credit transactions and transfers. Fafchamps and Lund (2003) also find similar results in a recent paper. This observation has been found to be true in the case of Bangladesh as well.

More recently, in contrast to the African scenario, Morduch (2004) identified several coping strategies for the households in Honduras after Hurricane Mitch. In the presence of missing insurance markets, he found in his study using 1998 data that about 21% of the affected households drastically reduced consumption as a main response to the hurricane. These households were unlikely to draw on insurance, erode assets, use savings or borrow funds.

It is well known that microcredit plays an important role in the lives of the poor people in Bangladesh. Pitt and Khandkar (1998, 2002) find in their papers that microcredit increases consumption and reduces poverty. It also helps smooth seasonal consumption during the lean periods. Amin, Rai and Topa (2002) find that poor households who participate in microcredit programs in Bangladesh tend to have relatively better access to insurance and other consumption smoothing devices than non-participants. Moreover, Rosenzweig (1988) found that access to financial mechanisms such as credit and remittances enable the household to manage risks and cope better.

Watts (1983) in his paper concluded that African households are forward looking and their responses are not arbitrary. In his survey he listed the following coping mechanisms in the order of frequency of adoption: storage of food during famine, borrowing from kin, temporary migration, sale of livestock, borrowing from money lenders, sale of domestic assets, sale of land and finally permanent migration. Cutler (1986) also listed similar coping mechanisms in his study of Beja famine migrants in Sudan.

Pleitez-Chavez (2004) finds evidence that households that are subject to adverse income shocks, tend to receive more transfers. He also found a positive correlation between the magnitudes of the negative shock and the amount of transfers. Yang and Choi (2007) found that in Philippines sixty percent of the exogenous reductions in income is matched by remittance inflows from abroad. The authors find evidence against the null hypothesis of unchanged consumption expenditures in households with migrant workers but they found strong significant evidence of variability in consumption expenditures in response to income shocks for households without any migrant worker.

The other most prominent coping mechanism adopted by poor households in response to shocks is accumulation or erosion of assets. In many parts of the developing world poor credit-constrained households disproportionately hold unproductive liquid assets as a precautionary measure. These precautionary reserves take the form of livestock, foreign currency, durable goods, crop inventories, land etc. (Udry 1995; Jalan and Ravallion, 2001; Gomez-Soto, 2007).

Even though the relationship between natural disasters and poverty is extensively studied, there are still some gaps in this literature. A handful of studies relevant to the literature summarized above pertain to the situation in Bangladesh. Even though Bangladesh is a small country geographically, it is visited by many natural disasters. The atrociousness of loss of lives and property reaches mammoth scale due to high population density. Household coping mechanisms have evolved in the face of repeated disasters despite the absence of structural support systems.

Rashid, Langworthy and Aradhyula (2006) use a trivariate probit model to analyze data from 1600 households across North Western Bangladesh to understand what determines the choice of coping strategies across households. Drought affected households were more likely to curtail food consumption while flood prone households were likely to borrow from formal and informal sources. Of all households, 72.4% reduced food consumption, 20.8% borrowed from NGOs, 24.1% borrowed from relatives and friends, 16% borrowed from money lenders and 10.7% borrowed from Grameen Bank. The study concluded that relatively wealthier households were not necessarily exempted from coping mechanisms though patterns varied depending on the nature and extent of the crisis.

Ninno (2001) et. al highlight borrowing from informal sources, purchase of food on credit, changing food patterns and erosion of assets as the most prominent coping strategies. However, they do not investigate what proportion of credit was spent on food. There could be a possible link between access to micro credit and food consumption which has not been tested for. Ninno (2001) and Rashid et. al (2006) conclude that changing food consumption patterns was the most important coping strategy for the households studied. Paul and Routray focus on indigenous building strategies as ex ante coping strategies besides curtailing food consumption as the most common ex post coping strategy in flood prone areas (2010).

Mohapatra, Joseph and Ratha (2009) observe countercyclical responses of remittances in post disaster scenarios using cross country macro economic data. For every dollar worth of damage, remittances would increase by one and half dollars over a period of two years for countries which had an emigrant stock of 10% of the population. Micro economic data led to the observation that remittances were an important factor in determining ex ante coping strategies in Burkina Faso and Ghana; households receiving remittances from developed countries were better prepared against natural disasters as they tended to live in houses made of concrete. In Bangladesh, households receiving remittances had higher per capita consumption compared to non recipient ones and were unlikely to rely on cash reserves or erode household assets.

Park (2006) highlights the presence of a strong informal insurance network in Bangladesh based on risk pooling, of which the 'bari' is the primary natural unit. Single household baris were found to sell off household assets such as livestock or crop reserves while baris with multiple households barely adopted any other coping strategy than informal borrowing. However, he does not investigate what prompts households to choose between self insurance and risk pooling as consumption smoothing strategies.

Khandker (2007) studies the impact of institutions on flood affected households' coping mechanisms, further validating the presence of an informal insurance network. An overwhelming majority of 77% households could raise money from multiple sources, of which only 2% and 9.4% raised funds from formal institutions and NGOs respectively. 33% of households which raised funds from multiple sources relied on immediate relatives while those 39.4% of households raising funds from a single source relied on friends and neighbors. Interestingly, the 'ponzi scheme' has not been studied in any of the above papers. Relatives or neighbors who haven't been affected by disasters could be borrowing from MFIs and then lending in turn, a possibility which has not been captured by any of the above studies.

Rayhan and Grote (2007) observe rural-urban migration as an alternate to credit. In the event of floods, the most vulnerable households experience accumulation of debt to various informal sources, often leading to default owing to the lack of sustainable livelihood mechanisms. As a means to replenish wealth lost in floods, the most vulnerable households often migrate to urban areas instead of resorting to borrowing. However, migration is often classified in the third and most extreme tier of coping mechanisms (Rashid et. al, 2006).

Osmani et.al (2015) introduces a novel conceptual framework to study vulnerability and coping mechanisms in Bangladesh. They introduced three types of economic shocks, namely, income, asset and expenditure shocks and investigated which type induces the household to adopt erosive coping strategy. Our paper borrows the same classification of shocks but extends the analysis by adding the intensity of shocks. We also focus on erosive coping but further the investigation by looking at most frequently adopted mechanisms. Distinctiveness of our paper from the ones discussed above stems from the analysis of adoption of just one or combination of several coping schemes for each type and number of economics shocks. None of the studies focused on the choice of different combinations of strategies adopted by households depending on the nature of shocks.

Using household level data from a nationally representative survey conducted in 2010 and revisited again in 2014, that has a separated rich module on risk and coping strategies, it is possible to address these gaps in existing literature. Thus this study bears important policy relevance. The data-set also contains a whole list of demographic and regional variables, allowing us to research the question with better accuracy and statistical sophistication. In this paper, we try to address the following questions: When individual households face economic shocks what type or combinations of coping strategies do they adopt? Do choices vary by the intensity or types of shocks faced? There are only a handful of papers researching this important issue using Bangladeshi data. Also most of these papers focus on a particular coping mechanism, e.g. consumption reduction, erosive savings, migration or microcredit. This paper is comprehensive in the sense that it analyzes all possible strategies for almost all types of disasters as well as combinations of all of these depending on the nature of various shocks.

3. Organization of the Paper

A summary of the incidence of shocks by various household demographic characteristics as well as regional and supply side characteristics is discussed first. A mean level comparison of the various coping strategies is discussed in the next section. A comparison of various coping schemes by income level, various demographic characters, nature and intensity of the natural disasters etc is also provided in the next section. A multivariate analysis follows investigating the impact of shocks on various forms of coping. Finally a discussion on the policy relevance of the coping schemes is provided.

4. Data Description

The Institute of Microfinance (InM) conducted a nationally representative household survey titled "Access to Financial Services" in 2010. It covered all districts across seven divisions excluding Rangamati. The same households were revisited in 2014. The sampling design of the 2010 survey is in line with the Household Income-Expenditure Survey of Bangladesh Bureau of Statistics (BBS). In 63 districts, 300 sampling units (villages in rural and wards in urban areas) were selected. 30 households are randomly selected from each primary sampling unit. The sample size was 6636 in rural areas and 2300 in urban areas, making it a total of 8936 households. The 2014 survey was conducted between May and June. However, all households from 2010 were not found in the subsequent survey, particularly in urban areas. In this case, mostly pseudo-panel was adopted where new households in same units were replaced. Total sample size in 2014 is 8462 households with 6570 in rural and 1892 in urban areas. The balanced panel data has a sample size of 8414 households with 6523 in rural areas and 1891 in urban areas.

5. Various Types of Economics Shocks in Bangladesh

Poor people in Bangladesh struggle to smooth consumption in the face of various economic shocks. Acute and chronic illness, loss of productive resources, loss of livestock and fisheries, floods, droughts and other natural disasters, river erosion, fire, crop failure, death of earning members etc. are some of the causes that affect family's income and consumption negatively. The dataset allowed for 19 different shocks and also allowed for more by adding the "others" category.

The following table provides the summary statistics of households which were affected by various types of shocks in 2010 and 2014. It also shows the frequency distribution of affected households in both rural and urban areas.

Table 1
Percentage of Households Affected by Different Shocks by Region

	2014			2010		
	All (n=8311)	**Rural (n=6426)**	**Urban (n=1885)**	**All (n=8936)**	**Rural (n=6636)**	**Urban (n=2300)**
Flood/Excessive rain	0.78	0.96	0.16	2.93	3.60	1.00
Strom/Cyclone/Tornado	2.05	2.47	0.58	2.48	2.98	1.04
River erosion	0.18	0.23	0.00	0.37	0.45	0.13
Catch fire	0.28	0.30	0.21	0.19	0.21	0.13
Suddenly losing jobs	0.16	0.12	0.27	0.20	0.15	0.35
Lack of rain/Drought	0.26	0.34	0.00	2.53	2.71	2.00
Crop diseases	0.61	0.76	0.11	2.72	3.01	1.87
Victim of cheating	0.40	0.36	0.53	1.22	1.18	1.35
Death of earning family member	0.53	0.48	0.69	0.66	0.71	0.52
Disease of other family member	9.65	9.54	10.03	23.71	24.16	22.43
Accident of earning family member	1.83	1.81	1.91	3.45	3.22	4.09
Death/accident of family member	0.81	0.82	0.74	2.92	2.56	3.96
Theft / Robbery	1.31	0.93	2.60	3.08	2.73	4.09
Death of cattle	2.08	2.49	0.69	3.36	3.83	2.00
Death/destroy of poultry	6.55	7.59	2.97	5.64	6.07	4.39
Fishery/fish resources damage	0.36	0.42	0.16	0.53	0.60	0.30
Loss in business	0.55	0.36	1.22	1.58	1.31	2.35
Litigation expense	0.85	0.86	0.85	1.67	1.79	1.30
Sudden stop of remittance	0.25	0.31	0.05	0.09	0.11	0.04
Other risk	0.57	0.59	0.48	1.92	2.09	1.43

In our sample, about 3.6 percent of the households in rural Bangladesh were affected by floods in 2010 but in 2014 fewer households were affected by floods or excessive rains in either urban or rural areas. A very small percentage of households reported losses due to river erosion in both the years. Around 2.5 percent of the sample households suffered some damage due to storms, cyclones or tornados in both years. A very small number of households reported losses due to fire, loss in industry or sudden decline in remittance receipts.

Since majority of our sample households are in rural areas and are predominantly agricultural households, the data reveals that only a very small percent of the households report any job loss or reduction in foreign remittances. The major shocks that affected most of the households consistently over the years are loss of livestock and death or illness in the family. About 6 percent of the sample households in rural areas suffered some loss in income due to death of livestock in 2010 while the corresponding number for 2014 is 7%. Similarly, around 24% of the households in 2010 and around 10% in 2014 report death or illness of adult earning members

of the households. The incidence of majority of the shocks is higher in rural areas than in the urban areas indicating that people in rural areas are more vulnerable.This trend is consistent over both the periods.

Natural calamities like floods, cyclones, rain storms, droughts and diseases of crop, cattle, poultry and fish affect agricultural households more which are predominantly rural. We clearly see a statistically significant difference between the percentages in the rural and urban areas for these types of shocks. These can be broadly categorized as covariate shocks. Again there are other risks which also affect the households or entrepreneur adversely but there are no significant differences in acuteness of occurrences in urban and rural areas. Examples include sudden loss of service, death of earning member, an accident of an earning member, an accident of other members, theft/robbery, litigation etc. These shocks are individual-specific and occur in isolation at different times to different individuals. There is not much difference over time in case of these particular shocks.

We probe this geographical difference more closely. In our data, about 52% of the rural sample households from 2010 report that they faced at least one crisis last year while corresponding number for 2014 is comparatively low at 27%. Since weather related shocks affect households that are predominantly dependent on agriculture, we tested if there was a statistical difference between households that are mostly rural and those that are urban.

Figure 1: Percentage of Affected Households by Location and by Year
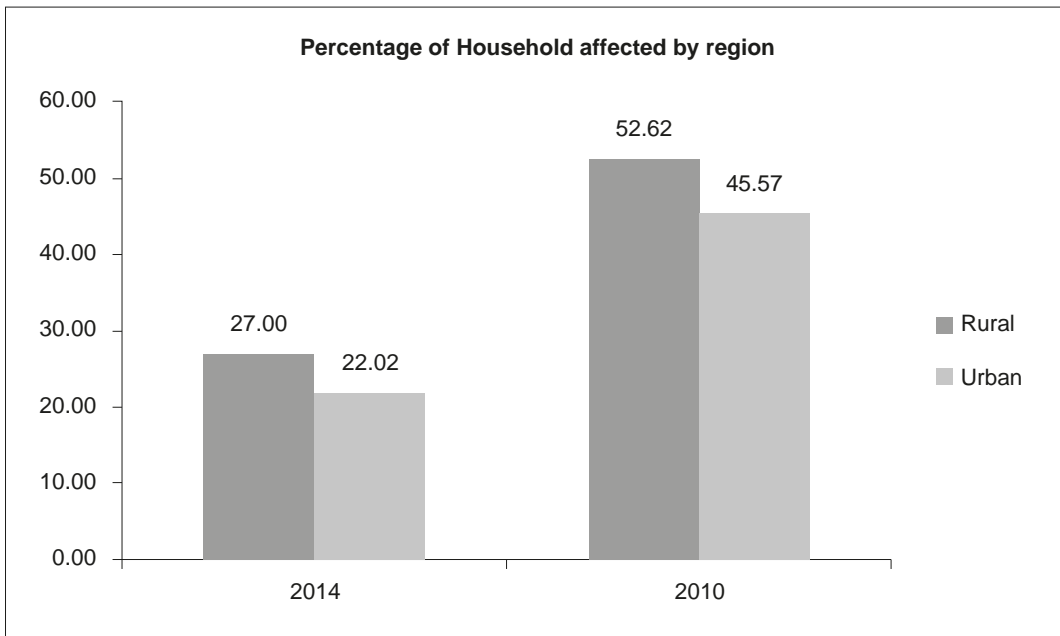
As expected, most of the disaster struck households are located in rural areas and difference between the sample proportions of rural and urban affected households are statistically significant at 5% level of significance or less.

It is also found in 2014 data that the geographical spread of the disaster or crisis-struck households is more or less evenly distributed across seven divisions of Bangladesh except Sylhet and Barisal. About 41% and 38% of households respectively from these two divisions were affected by some form of crisis last year. In 2010 we observe that households in Barisal, Rajshahi and Rangpur division were more affected by economic shocks.

Figure 2: Geographical Distribution of Affected Households
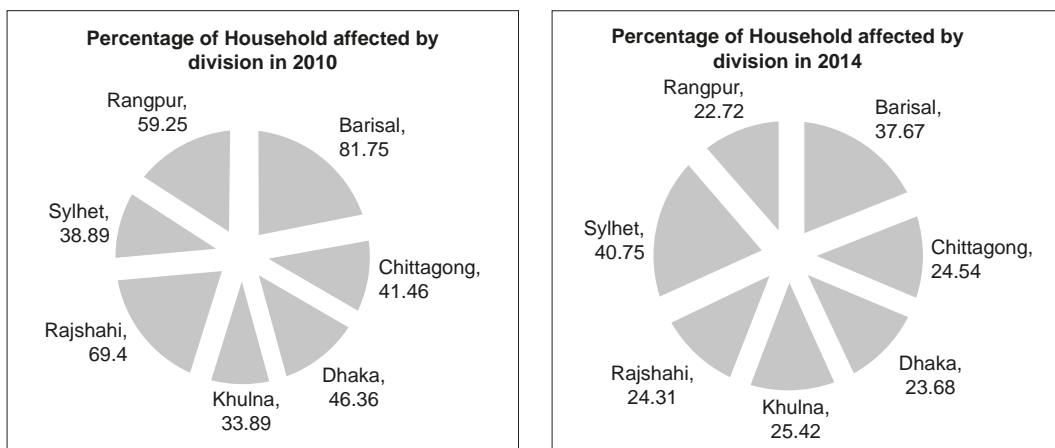
6. Various Coping Stategies

Risk affects households or entrepreneurs in different ways, with different intensities and has a wider impact on the specific households' well-being. Depending on the intensity and nature of risk a household adopts proper coping strategies for mitigating, reducing and managing risk and smoothing consumption.

In order to smooth consumption, erosive strategy remains the principal mode of coping when households face any income shock. Eroding savings leads the chart as about 29.14 percent of the households have tried to mitigate shocks by drawing down previous savings. It is not surprising to see that taking a new loan from a financial institution is the second major coping scheme adopted by households. About 12.25 percent households cope by borrowing from a different MFI as the usual norm of a MFI is to provide only one loan at a time to one individual. Again informal and formal help/support is one of the major strategies for poor households who can't save or don't have access to credit. In this regard informal sources such as friends and family always play a major role. About 10.80 percent of households cope through informal support. A very small fraction of the households relied on insurance or government programs. Some other important strategies are selling labor and crop in advance. About 6 percent of the sample households have adopted these two means. Selling and mortgaging land is also a prominent way of coping /managing risk. About 3.5 percent of the households resorted to such strategies. Since land is a vital productive resource, a household would be less inclined to sell the land.

Table 2
Households Coping Strategies

	2014			2010		
	All (n=2150)	**Rural (n=1735)**	**Urban (n=415)**	**All (n=4540)**	**Rural (n=3492)**	**Urban (n=1048)**
From saving	47.81	44.32	62.41	34.82	30.53	49.14
From insurance	0.28	0.29	0.24	0.29	0.14	0.76
Assistance from relatives	12.14	11.53	14.70	15.95	16.01	15.74
Non-government aid	0.05	0.00	0.24	0.93	1.00	0.67
Government aid(VGD,VGF)	0.19	0.23	0.00	0.15	0.11	0.29
Government aid(Allowance for aged people	0.05	0.06	0.00	0.26	0.23	0.38
100 days program	0.23	0.23	0.24	0.07	0.06	0.10
New loan(from bank/MFI/ NGO/Informal)	12.23	11.99	13.25	15.57	16.21	13.45
Selling advance labor	0.47	0.52	0.24	3.59	3.89	2.58
Selling advance crop	0.60	0.69	0.24	3.30	3.67	2.10
Selling land	1.12	0.86	2.17	1.52	1.75	0.76
Mortgage land	0.65	0.81	0.00	2.44	2.92	0.86
Didn't do anything for remedy	45.53	50.09	26.51	31.83	34.19	23.95
Aid from CLP and others	2.88	3.17	1.69	10.29	11.17	7.35

There is a significant difference in the coping mechanisms adopted by households based on the geographical location. Urban households adopt erosive strategies in the sense that 46% of affected households mitigate shocks through withdrawal of savings. The relevant number is 30% for rural populace and the difference is statistically significant at 5% or less. Also strategies such as advance sale of labor and crop, selling and mortgaging land are adopted mostly by rural households and only a hand full of urban households; therural urban difference is highly statistically significant. Since rural households are predominantly agricultural and land is a chief mode of production, these are not surprising findings. In terms of the other strategies, there are not much differences in the adoption frequencies between the rural and urban populace.

7. Demographic Characteristics and Coping Strategies

The coorelation between households' demographic characteristics and their adopted coping strategies are very important. This will help us to evaluate more effective coping strategies depending on the nature and intensity of the shocks.

There is a positive association between income and erosion of savings as a coping means. About 38% of the households belonging to the highest income quintile cope by withdrawal of savings whereas only 18% percent of the households in the lowest income quintile adopt this

Table 3
Households Demographic Characteristics and Coping Mechanisms

Demographic Character-istics	Coping Strategies							
	Savings or insurance	Relatives	GO and NGO supports	New loan	Advanced labor sale	Advanced crop sale	Land mortgage or sale	No action taken
Income								
Lowest	18.69	13.98	0.41	10.07	3.69	3.02	3.28	31.7
2nd	26.41	13.03	0.38	13.46	3.99	2.85	3.56	27.02
3rd	30.74	10.46	0.11	14.21	3.82	2.7	2.1	25.79
4th	34.3	8.1	0.09	15.28	1.35	1.61	3.68	26.13
Highest	38.25	7.36	0.05	8.16	1.1	4.53	4.33	26.43
Occupation of head								
Service	37.71	11.78	0.07	8.56	1.15	2.53	2.45	19.52
Self employment	29.94	8.03	0.21	12	1.67	3.49	4.46	31.05
Day labor	25.47	14.27	0.18	15.27	5.7	2.39	2.12	25.16
Others	28.48	10.9	0.63	8.21	1.28	2.13	3.16	27.52
Education of head								
Illiterate	24.49	12.76	0.39	13.27	4.29	2.83	3.78	28.32
<5	30.12	10.05	0.17	13.57	2.39	1.96	2.44	27.92
6-9	34.66	9.35	0	9.49	1.47	3.26	2.65	24.79
SSC	29.72	9.62	0	11.56	3.01	6.49	4.83	31.1
HSC	37.08	5.68	0.19	9.53	0	1.92	4.9	26.58
HSC+	47.09	7.77	0	9.25	0	3.76	4.01	16.86
Age of head								
below 30	30.4	11	0.08	11.73	3.19	2.09	3.05	26.13
30 - 40	30.8	9.76	0.11	13.45	3.99	2.87	2.84	26.24
40 - 50	29.41	10.53	0.09	12.41	2.07	3	3.56	27.53
50 - 60	28.94	11.11	0.58	10.7	1.79	3.39	2.59	30.93
60+	23.03	13.21	0.6	12.29	2.23	3.87	6.35	28.63
Source: Access to Financial Services, (InM, 2010)								

mode. The difference is highly significant at 5% or less. This finding is not surprising. Poorer households cannot save as much as the higher income groups. On the other hand informal support (from friends and family) has a negative relation with income; that is low income households mainly receive support from their kin when they are affected by any income shock. Similarly new loan as a coping strategy is prominent for middle income groups but not for the highest income quintile. However advance labor or crop sale is also an effective strategy for the low income households. Richest households in the sample also sell the crops in advance to manage a risk.

Service holders mostly use savings or insurance to cope as 37.71 percent service holders use this strategy. Taking a new loan is adopted more by self-employed agents and day laborers compared to service holders. Advanced sale of labor would be an obvious choice for day-laborers and this is confirmed by data. The statistical difference between various occupational groups in using advance sale of labor is highly significant.

Adoption of various coping schemes varies significantly by the level of education of the household head. There is a positive association between erosion of savings and education level. Highly educated groups are usually service holders and belong to richer income quintiles. They have relatively better access to savings and insurance; data reveals that this is their preferred mode of mitigation. Another important result is that less educated households rely on a new loan to cope compared to households where the head has HSC or higher level of education.

Coping schemes do not vary significantly with age of the household head except for the mode advanced sale of labor. Younger household heads tend to adopt this strategy more compared to relatively older ones.

8. Multivarite Analysis of Coping Mechanism

Depending on the severity and the nature of the shocks, households adopt a gamut of different strategies. They might also combine different strategies to guard against transitory and permanent shocks. The questionnaire listed 13 possible coping strategies and also allowed the respondents to cite/mention other ones not included in the list. The coping methods listed in the questionnaire are: use of savings; insurance; financial help from relatives, NGOs, and government; new micro-loan, mortgage or sale of land etc. The literature suggests that informal insurance arrangements, borrowing from kin, community cooperatives etc may be ineffective for shocks that are common to all members of the informal insurance groups. Households also cope by borrowing from multiple sources, formal and informal credit markets as well as MFIs. Remittances and sale of assets are also seen as coping mechanisms adopted by households. Much is not known about the simultaneous memberships of various MFIs or combination of several techniques as coping strategies in Bangladesh.

With this background information in mind, we proceed to identify for each type of disaster, shock or crisis andthe most likely coping method adopted by households. The coping strategies might vary by the demographic and socio-economic conditions of the affected households. We delve into that analysis with a view to recommend and formulate appropriate, efficient policies, and to help in identifying the right target groups.

In order to examine the determinant of vulnerability with econometrical rigor, we specify empirical models which permit tests of hypotheses concerning the adoption of various coping strategies, depending on the types and severity of shocks controlling for access to infrastructure, availability of formal and informal credit, microcredit, remittance etc.

We basically are interested in the following:

- What are the most likely strategies adopted by households depending on the nature and intensity of the shocks? We first distinguish between erosive and non-erosive coping schemes. We also classify economic shock into three categories: Income, asset and expenditure shock (following Osmani and Ahmed 2015) The household may just face one shock or many different types of shocks in the span of a year. For each of these different economic shocks, households might resort to a single coping scheme or combine two or more different stategies. We investigate the most significant determinants of adopting erosive coping scheme for just one versus multitude of shocks. The multivariate probit models shed light on the likelihood of adoption of erosive strategy for three types of economic shocks..

- We try to identify through a multinomial probit model, the relative likelihood of one or combination of two or more coping mechanisms for each of the three economic shocks.

Thus to assess the likelihood of various choice strategies adopted by households based on the observed characteristics of the households and the nature of the income shocks, we would adopt both probit and multinomial conditional probit model for our estimation.

A particular household may face just one type of shock or become subject to many economic catastrophies in one year. The household may resort to just one type of coping mechanism or adopt multiple coping schemes for one or multitude of shocks. Each of our three broad categories of shocks, encompasses several shocks from our list of 20 different types. It is possible that for each of the economic shocks, the household may not adopt any coping measure at all. It might again adopt erosive, non-erosive or some combination of these two coping schemes. We try to address this complex problem in stages through several different specifications and estimation models.

In each of the specifications, we controlled for the severity of loss; household's access to formal, and informal credit;or microcredit; access to any insurance and safety net programs; whether the household head's principle occupation is agriculture; education, age and gender of the household head; total land ownership, household size; number of earning members and number of migrants in the family; rural residence, total monthly food expenditure, household's access to infrastructure and local business opportunities; year dummies and six division dummies. The choice of the controls are based on past literature on coping mechanisms of rural poor households.

In addition to the standard household level demographic control variables like family size, region of residence, age of the household head, some other important supply side variables namely, education, electricity coverage, duration of MFI membership, etc. are included in our regression analysis. Among the household level characteristics, household head's education level plays an important role in the choice of coping strategies. Higher education implies access to information about potential income shocks and available coping strategies. The household is able to make better informed decisions regarding ex-ante and ex-post coping strategies when faced with

income shocks. A relatively poor household's marginal disutility from income loss is much higher than a wealthier household. Household's permanent income level would affect the choice of coping mechanisms. Education of household head and the electricity coverage are used as proxies for household level permanent income. An individual having a longer term relationship with MFIs would have more information and more faith on the activities of the MFIs. It also reflects larger loan sizes which enable the household to access bigger sums of money and confirms the bankability of the client. Loan size is included to capture this effect. Rural areas are characterized by a high degree of economic fragmentation. Long distances, difficult geography, lack of paved roads and lack of public transportation make accessibility to markets difficult and expensive. We included divisional dummies and a binary indicator for rural areas to address the importance of regional and infrastructural facilities in the choice of coping strategies.

The choice variables of interest are intensity of shocks, represented by Only One Shock and Two or More Shocks last year; and three types of economic shocks, Income, Asset and Expenditure Shocks. Model one studies the intensity and model two investigates the types of shocks and their influence on households' choice of risk-mitigating schemes.

9. Likelihood of Adopting Erosive Coping Strategy

First we identify the likelihood of availing erosive strategy if the household faced any type of shock last year, faced just one or two or more shocks, and the three types of economic shocks using probit models. For each of the five specifications in table 4, the data conclusively supports the fact that erosive coping is a dominant strategy for households except asset shocks. The coefficients on 'any shock faced', 'one' and 'two or more', 'income', 'asset' and 'expenditure' shocks are highly significant at 5 percent or less.

Table 4
Probability of Adoption of Erosive Coping Strategy for Different Types of Shocks
Dependent Variable: Adopted Erosive Strategy=1, 0 Otherwise

Any Shock Faced?	2.422** (0.000)				
Only One Shock Faced?		2.445** (0.000)			
Two or More Shocks		2.999** (0.000)			
Income Shock			0.178* (0.0269)		
Asset Shock				-0.338** (2.25e-06)	
Expenditure Shock					0.653** (0.000)
Total Loss	0.0806* (2e-08)	0.0664** (5e-06)	0.241** (0.000)	0.246** (0.000)	0.228** (0.000)

Table 4 (Cont.)
Probability of Adoption of Erosive Coping Strategy for Different Types of Shocks
Dependent Variable: Adopted Erosive Strategy=1, 0 Otherwise

Access to Bank	0.0953	0.110	0.153	0.190	0.169
	(0.512)	(0.447)	(0.272)	(0.172)	(0.229)
Access to Informal Credit	0.109+	0.112+	0.0879	0.0985+	0.0175
	(0.0610)	(0.0562)	(0.114)	(0.0764)	(0.758)
Access to Microcredit	-0.0454	-0.0313	-0.0840	-0.0871	-0.0974+
	(0.450)	(0.605)	(0.141)	(0.127)	(0.0923)
Insurance	0.246**	0.260**	0.211**	0.210**	0.192*
	(0.0028)	(0.0017)	(0.0061)	(0.00654)	(0.0141)
Principle Occupation Agriculture	0.00127	-0.0104	-0.00823	0.00466	-0.000481
	(0.984)	(0.868)	(0.890)	(0.938)	(0.994)
Distance to Paved Road	-0.0119	-0.00551	-0.00883	-0.00397	0.000211
	(0.602)	(0.810)	(0.685)	(0.856)	(0.992)
Distance to Small Market	-0.075*	-0.0774*	-0.0570*	-0.0567*	-0.0487+
	(0.0119)	(0.0101)	(0.0461)	(0.0474)	(0.0929)
Distance to Big Road	0.0102+	0.00797	0.00922+	0.00938+	0.00808
	(0.0829)	(0.180)	(0.0884)	(0.0813)	(0.150)
Availed Safety Net Program?	-0.0258	-0.0364	-0.0341	-0.0214	-0.0834
	(0.710)	(0.605)	(0.608)	(0.748)	(0.221)
Total Land Holdings	-0.0176	-0.0210	-0.0286+	-0.0267	-0.0249
	(0.319)	(0.238)	(0.0856)	(0.109)	(0.141)
Household Head: Illiterate	-0.112	-0.115	-0.0418	-0.0474	-0.0316
	(0.391)	(0.381)	(0.735)	(0.701)	(0.801)
Household Head: Primary	-0.0863	-0.0917	-0.0594	-0.0660	-0.0541
	(0.501)	(0.478)	(0.626)	(0.588)	(0.661)
Household Head: Secondary	-0.0563	-0.0251	-0.0427	-0.0473	-0.0518
	(0.656)	(0.844)	(0.723)	(0.695)	(0.672)
Log of Food Expenditure	-0.0101	0.000270	-0.0376	-0.0359	-0.0430
	(0.905)	(0.997)	(0.640)	(0.655)	(0.598)
Rural Area	-0.0530	-0.0525	-0.0350	-0.0200	0.0295
	(0.594)	(0.599)	(0.707)	(0.830)	(0.757)
Age of Household Head	-0.0020	-0.00172	-0.00357	-0.00412+	-0.00374+
	(0.363)	(0.450)	(0.101)	(0.0598)	(0.0907)
Electricity	0.0415	0.0352	0.00916	0.00862	0.0300
	(0.502)	(0.572)	(0.878)	(0.885)	(0.618)
Number of Family Members	0.0222	0.0159	0.0279	0.0231	0.0268
	(0.361)	(0.515)	(0.228)	(0.321)	(0.255)
Number of Earning Members	-0.0224	-0.0273	-0.0195	-0.00248	-0.00514
	(0.561)	(0.481)	(0.598)	(0.947)	(0.891)
Number of International Migrants	0.0380	0.0691	-0.0154	-0.0245	-0.0365
	(0.672)	(0.443)	(0.855)	(0.772)	(0.671)
Number of Domestic Migrants	0.0275	0.0438	0.0101	-0.00709	-0.00527
	(0.634)	(0.452)	(0.855)	(0.899)	(0.925)
Constant	-3.03**	-3.012**	-1.863**	-1.786**	-1.945**
	(5e-05)	(6e-05)	(0.0067)	(0.00949)	(0.00539)
Observations	5,428	5,428	5,428	5,428	5,428
Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1					

It is also evident that the higher the total loss suffered the greater is the likelihood of adopting erosive coping schemes for any of the three economic shocks. This impact is positive and highly significant. Access to formal banking has little role in adopting erosive strategy irrespective of the nature of the shock incurred. Access to informal credit increases the likelihood of adopting this particular method in case of asset shocks faced by the household but not for income or expenditure shocks. Also it postively impacts the adoption if the household faced any shock at all and also when households face just one or multiple shocks. Having availed any form of insurance makes the household highly likely to adopt erosive coping strategy irrespective of any types of shocks faced. The coefficients are highly significant in all of our five specifications. It is interesting to observe that proximity to small local market is positively associated with availing erosive coping while the greater the distance from bigger markets, the more likely it is for households to resort to erosive coping. There is no statistically significant relation between erosive coping and education of the household head. Having larger families is positively associated and more earning members in the family is negatively associated with erosive coping but the impacts are not statistically significant. The other controls have expected signs but are not statistically relevant in adoption of erosive coping strategy in the event that the households faced any type, one or multiple, or the three types of economic shocks.

10. Likelihood of Adopting Different Coping Strategies

We wanted to investigate at length the most frequently adopted coping strategies by the households in Bangladesh and whether there is any variation depending on the nature and intensity of the shocks. We adopt two approaches to identify the frequently used strategies out of the listed 14 in the survey:

a. Factor Analysis
b. Frequency Distribution

Factor analysis identifies common coping capability of the households and reduces the number of 14 variables to a smaller number according to common covariates. These grouped variables are most likely to be independent of each other. It is a statistical technique which explains a set of observed variables in terms of a smaller number of latent variables called factors. These latent factors are assumed to account for the correlations among observed variables. Thus the common covariate of all these coping variables would capture the latent coping capability of the affected households. We do not assume at the outset that one factor would overwhelmingly explain the entire common covariance matrix of these 14 variables. On the contrary, we let the data determine the number of factors to be retained and try to interpret them according to the factor loadings of the variables[*]. The following figures show the results of the factor analysis for 2010 and 2014 in a nutshell.

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[*] We use factor analysis instead of principle component analysis as the latter imposes the restriction that all the components completely explain the correlation structure among the variables. Factor analysis, accounts for the covariance of these variables in terms of a much smaller number of common covariates (factors). Factor analysis does not force the common factors to explain the entire covariance matrix. That is it allows the individual-variable specific influences to explain the remaining variances.
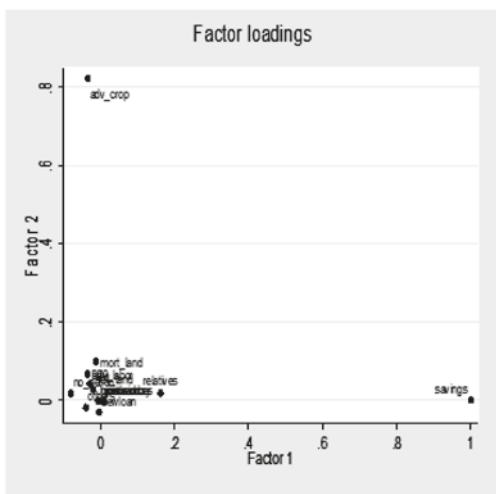
Figure: Factor Loading of 2010 Data   Factor Loading of 2014 Data
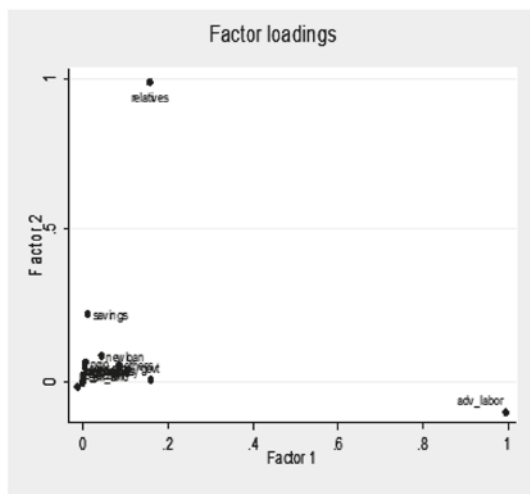
The factor-loading graph of 2010 data indicates that advanced crop sale, mortgaging land and eroding savings are distinctly different and the rest of the strategies co-vary together; whereas help from relatives, erosion of savings, and advanced sale of labor are distinct from the others in 2014 data. The determinants of these coping schemes would be analysed in the following section. In the survey the respondents could list a maximum of 3 coping schemes out of 14 for each of the 20 shocks they could face. We calculated the maximum number of times a particular coping scheme was listed for each type of shock and aggregated them. The most frequently used schemes are erosion of savings, help from relatives and taking a new loan. A significant number of people listed 'no coping' in their responses. The results from factor analysis are very similar to highest frequency calculation.

In table 5 the dependent variables are dummy variables. If the household takes no action, draws on savings, takes a new loan, receives help from relatives, resorts to advanced sale of crop or labor or mortgages land, the corresponding dependent variable takes the value of 1 and 0 otherwise. We observe that when the household faced just one or multiple shocks, it is highly likely to draw down savings, seek help from relatives and take a new loan. The coefficients for 'one shock' or 'two or more shocks' are highly significant at 1 percent or less in each of these three regressions.

The likelihood of adoption of each of these seven coping strategies for each of the economic shocks: income, asset or expenditure are reported in tables 6 to 8 respectively.

It is seen that in the event of an income shock, the household is highly unlikely to take any action at all. But when considered in isolation, the household is highly significantly likely to use savings as a coping strategy. The household is also highly positively likely to seek help from relatives but negatively likely to resort to advanced sale of crops to mitigate the income shock. In case of income shock the household has no possibility of adoption of schemes such as new loan, advanced sale of labor or mortgaging land.

It is quite interesting to note that for asset related shocks, the household is less likely to adopt any of the coping mechanisms. The results of the negative likelihood is significant for savings, relatives, new loans, advanced sale of labor or crop at 5 percent or less. The household is highly likely to take no action at all in case of an asset shock.

Contrary to the findings related to asset shocks, the household is high likely to adopt erosive savings, help from relatives, new loans and mortgaging when it encounters expenditure shocks. It is negatively likely to take no action, advanced sale of crop or labor. The estimates are highly significant at 1 percent or less except for advanced sale of labor, advanced sale of crop and mortgaging land in which case the level of statistical significance is at 10 percent or less.

The signs of other controls in tables 6 to 8 are as expected. It is interesting to observe that as the total land holdings of the household increases the household is less likely to adopt erosive savings, help from relatives, take a new loan or advanced sale of labor but positively likely to take no action at all, mortgage land and advanced sale of crop. This is consistent irrespective of the nature of the shock as listed in these four tables.

Table 5
Probit Models of Adoption of Different Coping Methods for One or More Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgage of Land
One Shock Faced	5.963	2.477**	1.705**	1.052**	3.996	4.518	3.074
	(0.954)	(0.000)	(5.36e-07)	(0.00478)	(0.974)	(0.983)	(0.988)
Two or More Shock faced	6.523	2.877**	1.859**	1.115**	4.722	5.112	3.211
	(0.950)	(0.000)	(1.89e-07)	(0.00410)	(0.970)	(0.980)	(0.987)
Total loss	-0.0369**	0.0444**	0.0971**	0.183**	0.0456	0.0231	0.261**
	(0.00975)	(0.00276)	(1.31e-06)	(0.000)	(0.241)	(0.515)	(4.91e-06)
Access to Banks	0.224	0.0932	-0.170	0.0309	0.0583	0.181	-0.139
	(0.137)	(0.531)	(0.417)	(0.884)	(0.845)	(0.597)	(0.722)
Access to Informal Credit	-0.0741	0.0900	-0.120	0.232**	0.0342	0.0770	0.147
	(0.226)	(0.132)	(0.101)	(0.00245)	(0.810)	(0.583)	(0.350)
Access to Microcredit	-0.101	-0.0194	-0.0600	0.421**	0.128	-0.0184	-0.108
	(0.109)	(0.753)	(0.431)	(1.88e-08)	(0.359)	(0.892)	(0.512)
Insurance	-0.198*	0.309**	0.103	-0.167	0.0773	-0.0577	-0.245
	(0.0278)	(0.000200)	(0.321)	(0.145)	(0.675)	(0.777)	(0.354)
Principle Occupation: Agriculture	-0.0619	-0.0119	0.0404	-0.0155	0.0762	0.0324	0.158
	(0.338)	(0.853)	(0.609)	(0.848)	(0.594)	(0.817)	(0.326)
Distance to Paved Road	0.00224	-0.00903	-0.00287	0.0148	-0.0499	0.0604	0.0401
	(0.923)	(0.704)	(0.927)	(0.618)	(0.401)	(0.148)	(0.469)
Distance to Small Market	0.0319	-0.0816**	-0.133**	0.0200	0.126*	-0.0747	-0.162+
	(0.297)	(0.00858)	(0.00119)	(0.602)	(0.0486)	(0.299)	(0.0677)
Distance to Big Market	0.0108+	0.00792	-0.0246*	-0.00781	-0.00195	-0.00452	0.00693
	(0.0862)	(0.185)	(0.0294)	(0.366)	(0.887)	(0.761)	(0.565)
Availed Safety Net Programs?	0.0546	-0.0223	-0.0815	-0.0752	-0.0363	-0.0541	-0.187
	(0.453)	(0.755)	(0.353)	(0.407)	(0.835)	(0.730)	(0.345)
Total Land Holdings	0.0575**	-0.0424*	-0.0802**	-0.0794**	0.154**	-0.122**	0.122*
	(0.00228)	(0.0193)	(0.000232)	(0.000550)	(0.000986)	(0.00223)	(0.0284)
Household Head:Illiterate	0.0469	-0.256+	0.0516	0.264	-0.237	0.195	0.176
	(0.729)	(0.0517)	(0.767)	(0.168)	(0.356)	(0.558)	(0.611)

Table 5 (Cont.)

Probit Models of Adoption of Different Coping Methods for One or More Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgage of Land
Household Head: Primary	-0.0226	-0.148	0.152	0.219	-0.369	-0.0587	0.218
	(0.867)	(0.254)	(0.375)	(0.250)	(0.152)	(0.861)	(0.523)
Household Head: Secondary	0.0766	-0.115	-0.0785	0.157	-0.231	-0.150	0.192
	(0.563)	(0.369)	(0.652)	(0.409)	(0.336)	(0.663)	(0.569)
Log of Food Expenditure	0.119	0.0538	-0.306**	-0.0898	-0.0382	-0.0973	-0.745**
	(0.180)	(0.534)	(0.00388)	(0.414)	(0.861)	(0.641)	(0.00320)
Rural Area	0.372**	-0.0709	-0.0129	-0.0848	0.173	0.0362	0.536
	(0.000948)	(0.484)	(0.914)	(0.491)	(0.578)	(0.878)	(0.563)
Age of the Household Head	-0.00314	-0.00170	0.00482+	-0.00215	-0.00341	-0.0126*	0.00796
	(0.187)	(0.468)	(0.0841)	(0.478)	(0.547)	(0.0353)	(0.168)
Electricity	-0.00853	0.0589	-0.0541	-0.259**	-0.0898	-0.241+	0.209
	(0.894)	(0.355)	(0.488)	(0.00118)	(0.538)	(0.0833)	(0.221)
Number of Family Members	-0.0675**	0.0146	0.0676*	0.0330	-0.114+	0.0255	0.162*
	(0.00861)	(0.557)	(0.0258)	(0.299)	(0.0737)	(0.680)	(0.0128)
Number of Earning Members	0.0876*	-0.0175	-0.0207	-0.0893+	0.206*	-0.0622	-0.0790
	(0.0284)	(0.658)	(0.666)	(0.0828)	(0.0274)	(0.523)	(0.439)
Number of International Migrants	-0.165+	0.161+	0.158	-0.143	-0.721	-0.329	-0.427
	(0.0849)	(0.0745)	(0.137)	(0.289)	(0.114)	(0.420)	(0.168)
Number of Domestic Migrants	-0.0290	0.0973+	-0.198*	0.0159	-0.119	-0.0798	-0.301+
	(0.633)	(0.0978)	(0.0142)	(0.835)	(0.396)	(0.594)	(0.0993)
Constant	-7.270	-3.393**	-1.360	-2.692**	-6.102	-9.038	-8.183
	(0.944)	(9.90e-06)	(0.153)	(0.00645)	(0.961)	(0.987)	(0.987)
Observations	5,428	5,428	5,428	5,428	4,901	5,428	4,284

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1 Dependent Variables are dummy variables which take the value of 1 if no action is taken, erosive savings, help from relatives, new loan, advanced sale of labor, advanced sale of crop and mortgaging land is undertaken. It takes the value of 0 otherwise. Each column represents the probit regression for each of the 7 dependent variables.

Table 6
Probit Models of Adoption of Different Coping Methods for Income Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Income Shock	0.607**	0.259**	0.182+	-0.000498	-0.660*	0.116	-0.351
	(0.000)	(0.00155)	(0.0711)	(0.996)	(0.0114)	(0.519)	(0.196)
Total Loss	0.245	0.220**	0.202**	0.239**	0.170**	0.157**	0.275**
	(0.345)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(2.82e-07)
Access to Bank	0.215+	0.143	-0.157	0.0180	-0.0721	0.143	-0.170
	(0.0658)	(0.315)	(0.454)	(0.933)	(0.809)	(0.672)	(0.668)
Access to Informal Credit	0.0627	0.0702	-0.125+	0.233**	0.0335	0.0550	0.149
	(0.177)	(0.215)	(0.0813)	(0.00215)	(0.808)	(0.683)	(0.346)
Access to Microcredit	-0.133**	-0.0679	-0.0823	0.402**	0.0599	-0.0335	-0.112
	(0.00670)	(0.245)	(0.270)	(5.55e-08)	(0.655)	(0.797)	(0.497)
Insurance	-0.153*	0.261**	0.109	-0.163	0.106	-0.0637	-0.231
	(0.0311)	(0.000772)	(0.283)	(0.151)	(0.549)	(0.746)	(0.384)
Principle Occupation Agriculture	-0.0148	-0.0163	0.0268	-0.0183	0.116	0.0282	0.181
	(0.768)	(0.790)	(0.729)	(0.820)	(0.402)	(0.834)	(0.264)
Distance to Paved Road	0.00330	-0.00888	-0.00471	0.0141	-0.0661	0.0428	0.0387
	(0.853)	(0.696)	(0.878)	(0.632)	(0.246)	(0.291)	(0.482)
Distance to Small Market	0.0428+	-0.0624*	-0.124**	0.0240	0.113+	-0.0616	-0.161+
	(0.0643)	(0.0349)	(0.00215)	(0.529)	(0.0635)	(0.365)	(0.0671)
Distance to Big Road	0.00613	0.00830	-0.0213*	-0.00752	0.00140	-0.000869	0.00785
	(0.154)	(0.129)	(0.0478)	(0.383)	(0.909)	(0.948)	(0.505)
Availed Safety Net Program?	0.0776	-0.0225	-0.0765	-0.0750	-0.0267	-0.0660	-0.162
	(0.172)	(0.741)	(0.376)	(0.405)	(0.874)	(0.664)	(0.413)
Total Land Holdings	0.0531**	-0.0488**	-0.0807**	-0.0806**	0.150**	-0.117**	0.121*
	(0.000218)	(0.00418)	(0.000134)	(0.000381)	(0.000905)	(0.00193)	(0.0295)
Household Head: Illiterate	0.0715	-0.170	0.102	0.287	-0.201	0.253	0.163
	(0.491)	(0.170)	(0.556)	(0.134)	(0.414)	(0.437)	(0.638)
Household Head: Primary	-0.0445	-0.116	0.175	0.232	-0.312	0.00947	0.210
	(0.663)	(0.340)	(0.304)	(0.221)	(0.207)	(0.977)	(0.539)

Table 6 (Cont.)
Probit Models of Adoption of Different Coping Methods for Income Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Household Head: Secondary	0.0823	-0.120	-0.0720	0.161	-0.265	-0.176	0.180
	(0.416)	(0.320)	(0.677)	(0.396)	(0.255)	(0.603)	(0.593)
Log of Food Expenditure	0.0930	0.00711	-0.321**	-0.0961	-0.108	-0.0975	-0.739**
	(0.168)	(0.931)	(0.00184)	(0.378)	(0.601)	(0.624)	(0.00340)
Rural Area	0.303**	-0.0411	0.0165	-0.0700	0.210	0.106	0.215
	(0.000585)	(0.664)	(0.888)	(0.564)	(0.492)	(0.640)	(0.583)
Age of Household Head	-0.00316+	-0.00355	0.00369	-0.00238	-0.00346	-0.0126*	0.00785
	(0.0879)	(0.112)	(0.174)	(0.428)	(0.525)	(0.0254)	(0.175)
Electricity	-0.0348	0.0297	-0.0632	-0.262**	-0.0857	-0.228+	0.202
	(0.487)	(0.627)	(0.410)	(0.000990)	(0.544)	(0.0907)	(0.237)
Number of Family Members	-0.0236	0.0251	0.0717*	0.0322	-0.0840	0.0247	0.161*
	(0.221)	(0.287)	(0.0147)	(0.307)	(0.157)	(0.673)	(0.0127)
Number of Earning Members	0.0568+	-0.00975	-0.0159	-0.0878+	0.223*	-0.0566	-0.0716
	(0.0679)	(0.796)	(0.736)	(0.0864)	(0.0128)	(0.546)	(0.486)
Number of International Migrants	-0.208**	0.0727	0.115	-0.165	-0.844*	-0.409	-0.456
	(0.00334)	(0.383)	(0.256)	(0.221)	(0.0435)	(0.298)	(0.143)
Number of Domestic Migrants	-0.0386	0.0636	-0.205*	0.00804	-0.194	-0.0998	-0.316+
	(0.417)	(0.255)	(0.0102)	(0.916)	(0.159)	(0.490)	(0.0846)
Constant	-2.529**	-2.184**	-0.607	-2.116*	-2.699	-5.158	-4.927
	(1.36e-05)	(0.00180)	(0.494)	(0.0234)	(0.111)	(0.953)	(0.981)
Observations	5,428	5,428	5,428	5,428	4,901	5,428	4,284

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1
Dependent Variables are dummy variables which take the value of 1 if no action is taken, erosive savings, help from relatives, new loan, advanced sale of labor, advanced sale of crop and mortgaging land is undertaken. It takes the value of 0 otherwise. Each column represents the probit regression for each of the 7 dependent variables.

Table 7
Probit Models of Adoption of Different Coping Methods for Asset Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Asset Shock	1.138**	-0.225**	-0.494**	-0.341**	-0.457*	-0.509*	-0.122
	(0.000)	(0.00195)	(2.76e-06)	(0.000740)	(0.0257)	(0.0220)	(0.534)
Total Loss	0.196**	0.224**	0.208**	0.241**	0.167**	0.163**	0.271**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(3.63e-07)
Access to Bank	0.174	0.170	-0.0804	0.0505	-0.00384	0.185	-0.144
	(0.229)	(0.230)	(0.699)	(0.813)	(0.990)	(0.582)	(0.714)
Access to Informal Credit	-0.0976+	0.0799	-0.115	0.242**	0.0354	0.0760	0.146
	(0.0977)	(0.158)	(0.109)	(0.00145)	(0.796)	(0.575)	(0.350)
Access to Microcredit	-0.169**	-0.0711	-0.0893	0.405**	0.0686	-0.0292	-0.112
	(0.00563)	(0.223)	(0.234)	(5.17e-08)	(0.609)	(0.823)	(0.498)
Insurance	-0.171*	0.260**	0.105	-0.168	0.0888	-0.0804	-0.230
	(0.0486)	(0.000795)	(0.307)	(0.142)	(0.612)	(0.686)	(0.382)
Principle Occupation Agriculture	-0.0641	-0.00118	0.0434	-0.0129	0.109	0.0416	0.168
	(0.302)	(0.985)	(0.578)	(0.872)	(0.431)	(0.758)	(0.296)
Distance to Paved Road	-0.0208	-0.00603	0.000425	0.0176	-0.0518	0.0467	0.0439
	(0.349)	(0.791)	(0.989)	(0.555)	(0.380)	(0.263)	(0.431)
Distance to Small Market	0.0433	-0.0617*	-0.126**	0.0234	0.111+	-0.0581	-0.167+
	(0.132)	(0.0364)	(0.00203)	(0.543)	(0.0719)	(0.401)	(0.0609)
Distance to Big Road	0.0111*	0.00862	-0.0204+	-0.00748	0.000163	-0.00171	0.00794
	(0.0443)	(0.113)	(0.0580)	(0.388)	(0.990)	(0.900)	(0.505)
Availed Safety Net Program?	0.0261	-0.0136	-0.0646	-0.0703	-0.0420	-0.0521	-0.183
	(0.710)	(0.841)	(0.458)	(0.438)	(0.804)	(0.733)	(0.356)
Total Land Holdings	0.0336+	-0.0471**	-0.0787**	-0.0790**	0.143**	-0.115**	0.117*
	(0.0604)	(0.00555)	(0.000209)	(0.000524)	(0.00136)	(0.0025)	(0.0349)
Household Head: Illiterate	0.122	-0.171	0.0727	0.295	-0.201	0.243	0.162
	(0.351)	(0.167)	(0.674)	(0.127)	(0.413)	(0.464)	(0.639)
Household Head: Primary	0.0547	-0.116	0.146	0.239	-0.340	0.0177	0.207
	(0.672)	(0.341)	(0.391)	(0.212)	(0.170)	(0.958)	(0.545)

Table 7 (Cont.)
Probit Models of Adoption of Different Coping Methods for Asset Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Household Head: Secondary	0.0631	-0.120	-0.102	0.175	-0.262	-0.187	0.174
	(0.622)	(0.319)	(0.555)	(0.361)	(0.259)	(0.586)	(0.605)
Log of Food Expenditure	0.0332	0.00544	-0.321**	-0.0840	-0.0637	-0.0857	-0.723**
	(0.695)	(0.947)	(0.00192)	(0.442)	(0.756)	(0.670)	(0.00394)
Rural Area	0.367**	-0.0277	0.0293	-0.0524	0.250	0.131	0.347
	(0.00100)	(0.769)	(0.803)	(0.667)	(0.417)	(0.568)	(0.349)
Age of Household Head	-0.00333	-0.00388+	0.00309	-0.00289	-0.00446	-0.0132*	0.00763
	(0.144)	(0.0830)	(0.259)	(0.339)	(0.409)	(0.0208)	(0.184)
Electricity	-0.0496	0.0292	-0.0726	-0.268**	-0.0947	-0.233+	0.216
	(0.422)	(0.632)	(0.348)	(0.000787)	(0.503)	(0.0862)	(0.207)
Number of Family Members	-0.0371	0.0210	0.0678*	0.0274	-0.0838	0.0147	0.161*
	(0.133)	(0.372)	(0.0221)	(0.386)	(0.153)	(0.802)	(0.0128)
Number of Earning Members	0.0338	0.00388	0.00461	-0.0758	0.207*	-0.0449	-0.0737
	(0.380)	(0.918)	(0.923)	(0.141)	(0.0208)	(0.636)	(0.469)
Number of International Migrants	-0.263**	0.0617	0.112	-0.170	-0.752+	-0.426	-0.449
	(0.00515)	(0.459)	(0.272)	(0.209)	(0.0734)	(0.291)	(0.151)
Number of Domestic Migrants	-0.00963	0.0500	-0.234**	-0.00591	-0.189	-0.110	-0.316+
	(0.869)	(0.371)	(0.00365)	(0.938)	(0.170)	(0.449)	(0.0853)
Constant	-3.163**	-2.103**	-0.465	-2.134*	-2.969+	-5.298	-4.863
	(1.35e-05)	(0.00261)	(0.601)	(0.0223)	(0.0757)	(0.961)	(0.981)
Observations	5,428	5,428	5,428	5,428	4,901	5,428	4,284

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1
Dependent Variables are dummy variables which take the value of 1 if no action is taken, erosive savings, help from relatives, new loan, advanced sale of labor, advanced sale of crop and mortgaging land is undertaken. It takes the value of 0 otherwise. Each column represents the probit regression for each of the 7 dependent variables.

Table 8
Probit Models of Adoption of Different Coping Methods for Expenditure Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Expenditure Shock	-0.470**	0.762**	0.206**	0.283**	-0.326+	-0.402*	0.297+
	(0.000)	(0.000)	(0.00894)	(0.000393)	(0.0586)	(0.0214)	(0.0620)
Total Loss	0.215**	0.205**	0.199**	0.232**	0.169**	0.169**	0.193**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Access to Bank	0.242+	0.162	-0.147	0.0318	-0.0548	0.162	-0.0655
	(0.0822)	(0.264)	(0.484)	(0.881)	(0.852)	(0.627)	(0.838)
Access to Informal Credit	-0.00942	-0.0133	-0.146*	0.188*	0.0582	0.0989	0.150
	(0.868)	(0.819)	(0.0444)	(0.0144)	(0.672)	(0.468)	(0.257)
Access to Microcredit	-0.155**	-0.0832	-0.0915	0.397**	0.0723	-0.0226	-0.0963
	(0.00831)	(0.162)	(0.221)	(9.29e-08)	(0.588)	(0.863)	(0.485)
Insurance	-0.142+	0.241**	0.0942	-0.171	0.107	-0.0502	-0.271
	(0.0892)	(0.00236)	(0.356)	(0.133)	(0.542)	(0.800)	(0.241)
Principle Occupation Agriculture	-0.0419	-0.00709	0.0359	-0.0135	0.0946	0.0203	0.165
	(0.482)	(0.909)	(0.643)	(0.867)	(0.492)	(0.881)	(0.224)
Distance to Paved Road	-0.00373	0.00319	-0.00155	0.0190	-0.0670	0.0392	0.0235
	(0.860)	(0.890)	(0.960)	(0.521)	(0.245)	(0.330)	(0.615)
Distance to Small Market	0.0321	-0.0543+	-0.122**	0.0300	0.102+	-0.0598	-0.121+
	(0.246)	(0.0727)	(0.00252)	(0.434)	(0.0951)	(0.378)	(0.0997)
Distance to Big Road	0.0123*	0.00683	-0.0215*	-0.00877	0.00238	-0.00170	0.00899
	(0.0201)	(0.234)	(0.0434)	(0.315)	(0.847)	(0.903)	(0.359)
Availed Safety Net Program?	0.0806	-0.0839	-0.0879	-0.0980	-0.00532	-0.0304	-0.152
	(0.230)	(0.231)	(0.310)	(0.281)	(0.975)	(0.842)	(0.371)
Total Land Holdings	0.0346*	-0.0459**	-0.0799**	-0.0781**	0.139**	-0.122**	0.128**
	(0.0452)	(0.00825)	(0.000160)	(0.000628)	(0.00177)	(0.00144)	(0.00550)
Household Head: Illiterate	0.0953	-0.167	0.103	0.288	-0.225	0.270	-0.0425
	(0.448)	(0.185)	(0.550)	(0.133)	(0.357)	(0.414)	(0.879)
Household Head: Primary	0.0187	-0.109	0.176	0.230	-0.351	0.0393	-0.0377
	(0.880)	(0.378)	(0.301)	(0.224)	(0.152)	(0.906)	(0.891)

Table 8 (Cont.)
Probit Models of Adoption of Different Coping Methods for Expenditure Shocks: (from Factor Analysis and Most Frequently Used)

Coping Schemes	No Action Taken	Savings	Help from Relatives	New Loan	Advanced Sale of Crops	Advanced Sale of Labor	Mortgaging land
Household Head: Secondary	0.0469	-0.132	-0.0747	0.153	-0.294	-0.145	0.0102
	(0.703)	(0.282)	(0.666)	(0.419)	(0.203)	(0.673)	(0.970)
Log of Food Expenditure	0.0364	0.00253	-0.327**	-0.103	-0.108	-0.0924	-0.416*
	(0.654)	(0.976)	(0.00157)	(0.345)	(0.594)	(0.645)	(0.0416)
Rural Area	0.344**	0.0261	0.0330	-0.0430	0.196	0.0759	0.0783
	(0.00130)	(0.788)	(0.779)	(0.725)	(0.523)	(0.741)	(0.672)
Age of Household Head	-0.00505*	-0.00376+	0.00360	-0.00263	-0.00402	-0.0126*	0.00750
	(0.0213)	(0.0996)	(0.186)	(0.382)	(0.459)	(0.0267)	(0.131)
Electricity	-0.0673	0.0526	-0.0573	-0.251**	-0.0733	-0.260+	0.162
	(0.256)	(0.397)	(0.456)	(0.00166)	(0.602)	(0.0573)	(0.254)
Number of Family Members	-0.0421+	0.0245	0.0703*	0.0338	-0.0764	0.0141	0.125*
	(0.0754)	(0.310)	(0.0168)	(0.285)	(0.192)	(0.812)	(0.0178)
Number of Earning Members	0.0700+	0.00641	-0.00663	-0.0839	0.197*	-0.0633	-0.0650
	(0.0580)	(0.868)	(0.888)	(0.103)	(0.0260)	(0.505)	(0.458)
Number of International Migrants	-0.251**	0.0532	0.108	-0.164	-0.779+	-0.442	-0.375
	(0.00502)	(0.531)	(0.283)	(0.223)	(0.0595)	(0.275)	(0.145)
Number of Domestic Migrants	-0.0584	0.0476	-0.213**	0.00184	-0.168	-0.0861	-0.231
	(0.299)	(0.402)	(0.00743)	(0.981)	(0.217)	(0.552)	(0.127)
Constant	-2.757**	-2.267**	-0.586	-2.117*	-2.582	-5.087	-3.756
	(7.57e-05)	(0.00152)	(0.509)	(0.0239)	(0.121)	(0.954)	(0.978)
Observations	5,428	5,428	5,428	5,428	4,901	5,428	4,284

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1
Dependent Variables are dummy variables which take the value of 1 if no action is taken, erosive savings, help from relatives, new loan, advanced sale of labor, advanced sale of crop and mortgaging land is undertaken. It takes the value of 0 otherwise. Each column represents the probit regression for each of the 7 dependent variables.

11. Likelihood of Adoption of Single Versus Multiple Strategies

First we try to analyse the likelihood of simultaneous adoption of multiple strategies comparing to no action taken, depending on the type of shock or the intensity of shocks by running multinomial probit models. The coefficients, even though difficult to interpret, provide us with the direction of the likelihood and relative strength of each choice. The three coping options are adopted: just one coping strategy, adopted two or more strategies and the base is no action taken.

It seems from model 1 and 2 in table 9 that the number of shocks faced in the last one year does not significantly increase or decrease the likelihood of choosing one or multiple coping methods. The log-odds of the choices to base outcome are not statistically significant for the variables only one shock and two or more shocks.

Table 9
Multinomial Probit for Adoption of 1 or 2 or More Strategies (No Coping, 0 as base)

	Only One Coping Method	2 or More Coping Methods	Only One Coping Method	2 or More Coping Methods
Any Shock Faced	-13.12	-0.300		
	(0.978)	(1.000)		
One Shock Faced			-14.40	-0.567
			(0.987)	(1.000)
Two or More Shock Faced			-13.73	0.941
			(0.987)	(0.999)
Total Loss	0.142**	0.510**	0.130**	0.452**
	(3.63e-06)	(0)	(2.29e-05)	(0)
Access to Bank	-0.410	-0.241	-0.389	-0.173
	(0.130)	(0.543)	(0.152)	(0.669)
Access to Informal Credit	0.272*	-0.0214	0.264*	-0.0296
	(0.0164)	(0.893)	(0.0203)	(0.854)
Access to Microcredit	0.124	0.191	0.142	0.233
	(0.285)	(0.232)	(0.222)	(0.155)
Insurance	0.346*	0.408+	0.350*	0.417+
	(0.0395)	(0.0721)	(0.0376)	(0.0711)
Principle Occupation Agriculture	-0.131	-0.0102	-0.136	-0.0511
	(0.261)	(0.951)	(0.246)	(0.763)
Distance to Paved Road	-0.00874	-0.0743	-0.00283	-0.0567
	(0.829)	(0.272)	(0.944)	(0.405)
Distance to Small Market	-0.0519	-0.128	-0.0533	-0.135
	(0.353)	(0.132)	(0.343)	(0.119)
Distance to Big Road	-0.0123	-0.0110	-0.0156	-0.0211
	(0.275)	(0.497)	(0.167)	(0.213)

Table 9 (Cont.)
Multinomial Probit for Adoption of 1 or 2 or More Strategies (No Coping, 0 as base)

	Only One Coping Method	**2 or More Coping Methods**	**Only One Coping Method**	**2 or More Coping Methods**
Availed Safety Net Program?	-0.0151	-0.163	-0.0312	-0.219
	(0.911)	(0.385)	(0.818)	(0.252)
Total Land Holdings	-8.81e-05	-0.00210*	-0.000136	-0.00219*
	(0.833)	(0.0185)	(0.746)	(0.0151)
Household Head: Illiterate	0.138	0.167	0.146	0.207
	(0.572)	(0.643)	(0.553)	(0.573)
Household Head: Primary	0.164	0.319	0.168	0.346
	(0.501)	(0.373)	(0.495)	(0.343)
Household Head: Secondary	0.0120	-0.169	0.0437	-0.0513
	(0.960)	(0.638)	(0.857)	(0.888)
Log of Food Expenditure	-2.71e-05	-9.98e-05**	-2.73e-05	-9.76e-05**
	(0.231)	(0.00405)	(0.226)	(0.00575)
Rural Area	-0.666**	-0.937**	-0.659**	-0.960**
	(0.00241)	(0.000652)	(0.00271)	(0.000575)
Age of Household Head	-0.000135	0.000776	0.000269	0.00170
	(0.975)	(0.899)	(0.951)	(0.784)
Electricity	-0.0154	-0.327*	-0.0178	-0.350*
	(0.896)	(0.0477)	(0.880)	(0.0378)
Number of Family Members	0.0850+	0.211**	0.0805+	0.206**
	(0.0614)	(0.000847)	(0.0753)	(0.00149)
Number of Earning Members	0.00553	-0.151	0.000540	-0.187+
	(0.940)	(0.153)	(0.994)	(0.0836)
Number of International Migrants	0.0794	0.0657	0.122	0.175
	(0.651)	(0.792)	(0.490)	(0.492)
Number of Domestic Migrants	0.0409	-0.357*	0.0452	-0.326+
	(0.711)	(0.0382)	(0.682)	(0.0624)
Constant	12.35	-4.162	13.73	-3.339
	(0.979)	(0.996)	(0.987)	(0.998)
Observations	1,990	1,990	1,990	1,990

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1
Dependent Variable Coping=0 is no action taken, Coping=1 if only one strategy adopted, Coping=2 if multiple strategies adopted

In table 10, we also observe that if the household faces a expenditure shock it increases the likelihood of the log odds of adopting just one or multiple strategies as compared to base. In case of such shocks, households would significantly adopt multiple coping schemes as the odds ratio is higher than that of the other option. The opposite is observed for asset shocks. Compared to the base of no action taken, the log-odds of adoption of just one or multiple strategies are less likely for asset shocks, while chances of adoption of multiple strategies are

even lesser. It is seen that in case of income shocks, the household is neither more nor less likely to adopt just one or multiple schemes as compared to the base of no action taken as the log-odds of these choices are not statistically significant. To test the consistency of the results we ran multinomial logit models. The exact same pattern is seen in the estimates as in multinomial probit models.

Table 10
Multinomial Probit of Adoption One or Multiple Strategies (No Coping, 0 as Base)

	Income Shock		Asset Shock		Expenditure Shock	
	Only One Coping Method	2 or More Coping Methods	Only One Coping Method	2 or More Coping Methods	Only One Coping Method	2 or More Coping Methods
Income Shock	-0.137	0.145				
	(0.281)	(0.334)				
Asset Shock			-1.211**	-1.340**		
			(0.000)	(0.000)		
Expenditure Shock					0.917**	1.066**
					(0.000)	(0.000)
Total Loss	0.100**	0.293**	0.0804**	0.274**	0.0891**	0.279**
	(4.21e-05)	(0.000)	(0.00124)	(0)	(0.000334)	(0)
Access to Banks	-0.355	-0.235	-0.231	-0.0648	-0.306	-0.156
	(0.112)	(0.406)	(0.315)	(0.821)	(0.178)	(0.587)
Access to Informal Credit	0.229*	0.00186	0.265**	0.0465	0.142	-0.103
	(0.0134)	(0.987)	(0.00539)	(0.688)	(0.130)	(0.372)
Access to Microcredit	0.0912	0.120	0.0936	0.122	0.0742	0.0982
	(0.333)	(0.296)	(0.334)	(0.298)	(0.438)	(0.401)
Insurance	0.274*	0.288+	0.277*	0.286+	0.236+	0.234
	(0.0405)	(0.0722)	(0.0442)	(0.0829)	(0.0814)	(0.153)
Occupation of Household Head: Agriculture	-0.113	-0.0211	-0.0998	0.0113	-0.123	-0.0145
	(0.239)	(0.859)	(0.309)	(0.926)	(0.204)	(0.904)
Distance to Paved Roads	-0.00765	-0.0524	0.0126	-0.0350	0.00476	-0.0407
	(0.820)	(0.261)	(0.717)	(0.469)	(0.888)	(0.392)
Distance to Small Market	-0.0413	-0.101+	-0.0400	-0.105+	-0.0289	-0.0943
	(0.372)	(0.0920)	(0.396)	(0.0895)	(0.536)	(0.124)
Distance to Big Market	-0.0102	-0.00669	-0.0109	-0.00748	-0.0137	-0.0105
	(0.278)	(0.566)	(0.249)	(0.527)	(0.162)	(0.383)
Safety Net Program	-0.00160	-0.120	0.0463	-0.0756	-0.0703	-0.197
	(0.988)	(0.369)	(0.682)	(0.582)	(0.532)	(0.150)
Total Land Holding	-5.47e-05	-0.00126*	-8.11e-07	-0.00118*	2.88e-05	-0.00123*
	(0.878)	(0.0297)	(0.998)	(0.0431)	(0.936)	(0.0366)
Household Head: Illiterate	0.121	0.164	0.0741	0.125	0.149	0.189
	(0.547)	(0.517)	(0.718)	(0.631)	(0.465)	(0.463)
Household Head: Primary	0.146	0.248	0.0684	0.192	0.151	0.261
	(0.468)	(0.323)	(0.739)	(0.455)	(0.458)	(0.307)

Table 10 (Cont.)
Multinomial Probit of Adoption One or Multiple Strategies (No Coping, 0 as Base)

	Income Shock		Asset Shock		Expenditure Shock	
	Only One Coping Method	2 or More Coping Methods	Only One Coping Method	2 or More Coping Methods	Only One Coping Method	2 or More Coping Methods
Household Head: Secondary	0.0208	-0.0837	-0.0327	-0.127	-0.000796	-0.109
	(0.916)	(0.738)	(0.871)	(0.620)	(0.997)	(0.668)
Log of Food Expenditure	-1.91e-05	-5.29e-05*	-1.97e-05	-5.34e-05*	-2.31e-05	-5.51e-05*
	(0.300)	(0.0229)	(0.299)	(0.0252)	(0.218)	(0.0199)
Rural Area	-0.467**	-0.673**	-0.436*	-0.652**	-0.309+	-0.486*
	(0.00512)	(0.000434)	(0.0106)	(0.000836)	(0.0666)	(0.0122)
Age of Household Head	-0.000236	0.000259	-0.00260	-0.00254	0.000115	0.000476
	(0.947)	(0.953)	(0.477)	(0.571)	(0.975)	(0.915)
Electricity	-0.0161	-0.230+	-0.0109	-0.236+	0.0142	-0.202+
	(0.867)	(0.0504)	(0.912)	(0.0503)	(0.885)	(0.0911)
Number of Family Members	0.0621+	0.145**	0.0616	0.143**	0.0682+	0.149**
	(0.0926)	(0.00127)	(0.105)	(0.00206)	(0.0688)	(0.00119)
Number of Earning Members	0.0153	-0.122	0.0718	-0.0570	0.0299	-0.101
	(0.798)	(0.103)	(0.244)	(0.460)	(0.622)	(0.186)
Number of International Migrants	0.0524	0.0789	0.0698	0.0944	0.0352	0.0639
	(0.711)	(0.651)	(0.633)	(0.598)	(0.806)	(0.717)
Number of Domestic Migrants	0.0388	-0.227+	-0.0251	-0.301*	0.0240	-0.252*
	(0.668)	(0.0570)	(0.787)	(0.0136)	(0.794)	(0.0380)
Constant	-0.512	-2.608**	0.149	-1.845**	-0.891+	-2.986**
	(0.262)	(4.03e-06)	(0.753)	(0.00158)	(0.0567)	(2.83e-07)
Observations	1,990	1,990	1,990	1,990	1,990	1,990

Controlling for Village Fixed Effects, gender of household head: male. Robust p values in parentheses, ** p<0.01, * p<0.05, + p<0.1
Dependent Variable Coping=0 is no action taken, Coping=1 if only one strategy adopted, Coping=2 if multiple strategies adopted

The other control variables show expected signs in all the models. Living in the rural area also reduces the likelihood of the choices of one or multiple mechanisms. As the family size increases the households are more likely to adopt one or multiple strategies with the chances of adoption of multiple strategies being higher. These patterns are consistent irrespective of the economic shocks and the number of shocks.

12. Conclusion and Policy Recommendations

There is a dearth of literature analyzing the combinations of various pathways by which households cope during a crisis in Bangladesh. To our knowledge this is the first study that investigates the relative likelihood of adopting various coping strategies for different kinds and various levels of intensity of shocks faced by the households. It is quite comprehensive in that sense.

We observe that households cope by adopting various strategies involving new MFI loans, sale and mortgage of land and labor etc. to mitigate losses due to income and expenditure shocks and higher number of shocks. The other prominent strategies adopted by these households are erosion of savings besides seeking loans from relatives and kin. As the total damage or losses from any shock increases, the likelihood of adoption of multiple strategies increases consistently for all the specifications.

In almost all of these scenarios, the role of loans from NGOs, Government programs and loans from formal credit market seem negligible for all types of crises and for all types of households,irrespective of their socio-economics characteristics. Erosive coping remains the predominant choice of coping by households. The significant role of insurance in mitigating shocks has important policy implications. Increase in accessibility of life insurance and other medical facilities would prevent erosion of physical and financial capital which is vital for productive efficiency of the households. Once diminished, it is often impossible for poor households to replenish this capital; as a result they might fall into poverty trap for good. Policy makers ought to pay attention to this as well.

Technical Note on Factor Analysis

In common factor analysis a small number of factors are extracted to account for the inter-correlation among the measured variables. This helps to identify the latent dimensions that explain most of the correlations among variables. We have a set of bargaining measure variables, $x_1 j, \ldots, x_N j$. We want q common factors which accounts for most of the covariance of the measured variables, x_N.

The standardized vector of observed variables can be expressed as a function of correlation of variables and uniqueness associated with each variable.

$$x = fA^{'} + e$$

where, $A = N * q$ factor loading matrix represents the correlation coefficient s between N variables and q common factors. The squared factor loading is the percent of variance in that variable explained by the factor.

$f = 1 * q$ matrix of factors

$e = 1 * N$ vector of uncorrelated errors with covariance equal to the uniqueness matrix, , which is $N * N$ diagonal matrix.

The variance of bargaining measures x, denoted by Z is composed into two parts:

$$z = AA^{'} + \psi$$

The factor scores can be obtained by (regression scoring, Thomson 1951)

$$\hat{f} = A^{'} Z^{-1} x$$

The Scores are the Indices That are Estimates of Components:

A very similar statistical procedure to factor analysis is PCA which accounts for the maximum portion of the variance present in the original set of variables. PCA is typically applied when the researcher instead of using all variables, wants to use some indices that contain all the information present in the measures. The PCA derives a small number of components accounting for the variability found in a relatively large number of variables. There are major differences between PCA and FA. In FA, it is assumed that the variance of a single variable can be decomposed into a common variance shared by all observed variables and a unique variance particular to a variable. While in FA, only the common variance of the measured variables are taken into account, Principle Components are defined simply as a linear combination of all observed variables;PCA makes no distinction between common and unique variance. PCA contains both common and unique variance.

Determining the Number of Factors in FA:

The most commonly used criteria in determining the optimal number of factors to be extracted are Kaiser-Guttman rule and the scree test.

The Kaiser-Guttman rule states that the number of factors to be extracted should be equal to the number of factors having eigenvalues (variance) greater than 1. A Scree plot illustrates the rate of change in the magnitude of eigenvectors for the factors. The point where eigenvalues gradually levels off indicates the maximum number of factors to be retained.

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