MICROFINANCIAL SERVICES AND RISK MANAGEMENT: EVIDENCES FROM SRI LANKA

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This paper examines the importance of financial services as risk coping mechanisms in Sri Lanka, while insurance and savings products function as ex-ante, i.e., preventive, strategies for consumption smoothing, credit is typically used as an ex-post risk coping strategy. Based on household survey data, it estimates the determinants of the household's use of one, two or all three types of microfinancial services and for different combinations of financial services applying ordered probit models. There is empirical evidence that household's probability to participate in microfinancial services increases with rising self perception towards risk. Further, it depends highly on the type of risk, if a household is more or less likely to use microfinancial services, whereas the accessibility to one, two or three microfinancial services are related to the experience of specific hazards in the past. In confirmation with earlier findings, the poor are less likely to use microfinancial services than their better-off counterparts.

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JEL classification: G20, O16, R22

1. INTRODUCTION

Microfinance is not only seen as a way to develop the institutional capacities of financial systems by serving the unbanked low-end financial market with loans in an efficient manner, but as well as measures to combat poverty by improving the financial capabilities of poor households. In recent years the microfinance movement has become

more and more demand-oriented and diversified introducing new product lines, i.e., savings and insurance products, to low-income groups in developing countries (Zeller and Sharma, 2002; Armendáriz and Morduch, 2005; Churchill, 2006). Several contributions exist so far in the literature on the determinants of households' use of financial services from the microfinance sector in developing countries emphasizing primarily loans, followed to a lower extent by savings and insurance (Muradoglu and Taskin, 1996; Jabbar *et al.*, 2002; Pal, 2002; Asfaw, 2003; Jütting, 2003; Bhat and Jain, 2006; Giné *et al.*, 2008; Swain, 2007; Barslund and Tarp, 2008). None of these assesses the participation in microfinancial services in a more holistic concept of microfinance. To our knowledge, Giesbert *et al.* (2011) is the first paper to show that households' decision for loans, savings products and insurances are highly interconnected and depend on one another for specific causes. Taking this into account, we argue here that microfinancial service participation of low-income households, i.e., the usage of no service, one service, two or all different types of microfinancial services, gives an indication of the diversification of household's financial behavior, respective of the importance and the risk management strategies in use. By doing so, we assume that the more diversified use of microfinancial services in the number and as well in quality, i.e., increasing complexity[1] of the financial services, is determined by the household's level of financial capability.

Therefore, we first attempt to identify the determinants for the three different types of microfinancial services by estimating separate probit models for each financial service. Second, we estimate the determinants, which affect the household's decision to use no, only one, two or all three different types of microfinancial services using an ordered probit model.[2] In addition, we calculate ordered probit models on specific combinations of financial services; for instance, no services, savings only, savings and loans, and all three financial services. We argue that the estimation of an ordered probit model might add additional value by investigating the kind of factors, which determine household's participation in more than one financial service and if a higher risk exposure in the past influences the household's decision to diversify and extend the uptake of microfinancial services. From this, we aim to derive insights which kind of role microfinancial services might play in terms of risk mitigation. Hereby, it is our objective to add to the discussion of the demand and supply side factors determining the participation in microfinancial services offered by microfinance institutions (MFIs) in Sri Lanka. Finally, we identify the households that use more than one service and the households that use no or only one service, by which the more or less financial capable

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[1] Insurance is widely seen as more complex and so harder to understand than savings products or credits, especially by the poor.

[2] On the one hand unobserved heterogeneity may influence household's participation in all financial services, but on the other hand a reverse causality may exist, as households without insurance may save more or take up more or higher loans to manage possible future shocks.

households are recognized.

A comprehensive survey of 330 households conducted in May to July 2008 in Sri Lanka is used in the analysis. Hereby, we focus on the use of financial services, which is determined by the demand and the supply of financial services (World Bank, 2008, p. 28). By analyzing the usage of microfinancial services, we do not estimate the determinants of demand for microfinancial services, but the determinants of their actual use. These are a mixture of interrelations between the demand for and supply of financial services in Sri Lanka. Only the households that have access to the financial service market can use financial services, so that we implicitly include access into our estimation of the usage of such services.[3]

The outline of the paper is as follows. Following this introduction, section 2 presents the conceptual framework of the study. Section 3 describes the methodologies, including data set, the summary statistics, and the estimation methods. Section 4 presents the results. Section 5 concludes.

2.   CONCEPTUAL FRAMEWORK

The paper argues that financial services function as important risk management mechanisms, while insurance and savings products are ex-ante, i.e., preventive, strategies for consumption smoothing, credit is typically used as an ex-post risk coping strategy. However, household's decision for loans, savings products and insurances are highly interconnected and depend on one another for specific causes (Giesbert *et al.*, 2011). First, compared to non-users, users of a financial service have an informational advantage due to their membership in a financial institution, and a higher level of financial literacy due to their ongoing experience with financial measures while using them. Second, savings play a major role as loan collateral. Third, there are financial products, for instance, credit life insurance, which includes a mandatory use of another service. Third, the feasibility and coverage of financial services differ in case of more diversified hazards. Therefore, we argue that microfinancial service participation of low-income households, i.e., the usage of no service, one, two or all three types of microfinancial services, give an indication of the diversification of household's financial behavior and the risk coping strategies in use, respectively.

[3] Users of financial services can be distinguished from nonusers. Among the nonusers are those who are excluded by themselves from the use of financial services voluntarily, such as households who do not use financial services due to cultural or religious reasons, and households who do not need or want to use financial services. The other group are the involuntarily excluded households who demand financial services, but do not have access to them in respect to insufficient income or lending risk, discrimination due to social, religious, or ethnic grounds, contractual and informational framework, and too high prices or inappropriate product features offered by the providers (World Bank, 2008, p. 29).

The study framework structures the relationship between household's participation in financial services and their level of financial capability, and household's abilities to use these as risk management strategies and their vulnerability.[4] Covering a wide range of savings, credit and insurance products, financial services are strategies to address specific financial needs of a household. These services can be provided formally or informally. The participation in financial services is as well determined by household's financial capability level, which are knowledge, skills, experiences, and attitudes, which make a household more or less capable to managing its money, preparing for risks, planning ahead and using financial services (PFRC, 2005; Matul, 2009). Financial capability, or financial literacy as it was initially conceived, is a combination of three interrelated elements, i.e., the knowledge, skills and attitudes that make a household capable to managing its finances (PFRC, 2005; Matul, 2009). Financial capability is a relative, not an absolute concept. It may be possible to define a basic level of financial capability, that is required by everyone in a given society. Beyond, the degree and nature of financial capability required by any given individual will be determined by their financial circumstances (PFRC, 2005). The knowledge is acquired by experience, education and training, and passively through information from different other sources, e.g., family and friends, media, information meetings organized by brochures from the microfinance institutions (PFRC, 2005; Matul, 2009). The state of knowledge will typically increase through a person's life cycle, but however, it can become redundant or inaccurate, if circumstances change. The person's knowledge need to be applicable to manage their money and to make appropriate financial decisions. Further, the person must be able to take the necessary steps to apply their knowledge and skills, which depends highly on the attitude towards financial capability. They must be willing to invest the time and other resources to apply their knowledge and skills, able to gain access to information, advice and other resources, and confident enough to exercise their skills and to act on the results.

In behavioral terms,[5] our analysis differentiates between more or less financial capable households (Matul, 2009). A more financial capable household is proactive, has a positive attitude towards managing its finance, take longer horizons in financial planning, save systematically, try to insure or at least prepare for risks, and borrow in a responsible way. Furthermore, the household uses differentiated financial services, i.e., more than one service, as risk management strategies, which may lead to higher asset accumulation in the future. A less financial capable household is more reactive, does not see much sense in or is not able to manage money, or plan ahead, and tends to live from

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[4] Vulnerability is defined here as household's risk exposure and their ability to manage such risks, the related consequences, and the microfinancial services participation as measures for managing shocks (Cohen and Sebstad, 2003; Matul, 2009).

[5] Four different areas of financial capability are identified, which are money management, planning ahead, risk preparation and usage of financial services (PFRC, 2005).

hand to mouth and respond spontaneously to risks. The household uses no or fewer financial services than the more financial capable household. This leads to a lower ability to respond to risk, they may occur in the future and thus to a higher vulnerability of the household. We analyze who the more and the less financial capable households are, i.e., the determining factors of such households. Financial capability is highly related to household's vulnerability (Matul, 2009). Siegel *et al.* (2001) suggest the degree of vulnerability depends on the characteristics of the risk and household's ability to address adequately to the expenditures, which are associated with the consequences of such risks.[6] Vulnerability can be divided into three steps of a risk chain: the incidence of the risk or risky event, the household's decision to choose which type of risk management strategy to respond to the consequences of the peril, and finally what the outcome is, i.e., the welfare loss of the household, of the incidence of the risk (Siegel *et al.*, 2001). If the household's welfare decreases after the experience of the shock, household's vulnerability comes explicitly from risks and the respective impact of risks shows the degree of household's vulnerability as well.

We analyze the household's participation in financial services, indicating its financial capability, as a possibility to manage the risks they are faced with. Therefore, it is important to note that in the literature, there are several empirical findings on the determinants of the usage of financial services in developing countries, which we use to derive predictions to control for in the estimations. The literature can be divided into three strands analysing each service of the three elements of the finance trinity separately (Giesbert *et al.*, 2011). There are considerably more studies discussing especially the issue of credit (Kochar, 1997; Atieno, 1997; Jabbar *et al.*, 2002; Nguyen *et al.*, 2002; Pal, 2002; Pitt and Khandker, 2002; Zeller and Sharma, 2002; Swain, 2007; Barslund and Tarp, 2008) than for savings (Gupta, 1970; Deaton, 1992; Gurgand *et al.*, 1994; Muradoglu and Taskin, 1996; Spio and Groenwald, 1996; Fafchamps *et al.*, 1998; Kimuyu, 1999; Aryeteey and Udry, 2000; Kiiza and Pederson, 2002; Hoogeven, 2003; Berg, 2010) or insurance in developing countries (Giesbert *et al.*, 2011; Asfaw, 2003; Cohen *et al.*, 2005; Jütting, 2003; Bhat and Jain, 2006; McCord *et al.*, 2006; Giné *et al.*, 2008; Giné and Yang, 2007). None of these studies estimate the differences between the determinants of household's participation in no, one, two or three microfinancial services. Nevertheless, all studies consider the impact of different determinants; especially several demographic and socioeconomic household characteristics on financial service uptake, from which it is possible to derive propositions for the estimations.

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[6] 'A household can be vulnerable to future loss of welfare below socially accepted norms caused by risky events.' (Siegel *et al.*, 2001, p. 4)

3.   METHODOLOGY

3.1.   Sources of Data and Summary Statistics

The analysis of this paper is based on a household survey conducted from May to July in 2008 all over Sri Lanka. The survey was undertaken for a research project on the demand for microinsurance among low-income households in Sri Lanka. In total 330 households were interviewed, including two strata of (micro) insured and non-insured households where the latter functions as the control group.

We chose to investigate Sri Lanka, as the financial market in Sri Lanka is still highly fragmented with access to financial services by only around 60 percent of the population, but is developing expeditiously (World Bank, 2008). The microfinance market is growing fast in the country and achieves the fourth highest ratio of borrowing clients to total population with four percent among the 20 countries with the highest microfinance penetration in the world (World Bank, 2006). In Sri Lanka, since 1980s, a group of NGO-MFIs have combined microfinance activities with other social and community development activities. Microinsurance has activated as a service to support the microfinance sector on providing loan protection insurance and life savings (Abeysinghe, 2007). The insurance market has achieved an insurance penetration rate of 1.46% in 2006 (ADB, 2006). Over the years, the sector has incorporated a wide range of insurance services, and commercial companies started to operate in the sector. For the insured strata, we chose five different MFIs, namely Women's Development Federation (WDF), Women's Development Banking Federation (WDBF), Sanasa Insurance Company (Sanasa), Yasiru Mutual Fund (YASIRU) and SEEDS (Sarvodaya Economic Enterprises development services, Ltd) as the main provider of voluntary microinsurance for low-income households in Sri Lanka.[7] These providers offer various insurance types, such as health, life, other life-cycle event, vehicle insurance, old age annuities/pension, credit, crop, and property insurance.

The survey outreach covered all provinces, i.e., includes 14 districts in which these MFIs operate. From each district, two or three MFIs have been selected except the districts of Vavuniya and Batticaloa. These are located in the Northern and Eastern provinces where only one of the selected MFIs, namely SEEDS, is operating. The selected number of insured and non-insured households from each district differs from 15 to 50.

The client bases of these institutions are used to select the insured clients. Selected numbers of households from each institution were allocated randomly across the districts in which they operate. Villages were selected in consultation with the district branch manager and staff, so that two or three villages were selected from each district

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[7] The participating institutions provide credit insurances as well, which are compulsory for the uptake of a loan or other financial product. Yet, these credit insurances are not considered in this study and the respective observations are dropped from the data set.

representing selected MFIs from the district. By doing so, we ensure that a high share of insured households were easily accessible for the survey. In total, 30 villages were covered under this study including 10 to 15 insured and non-insured households. However, we suggest our findings at least a representative for villages all over Sri Lanka in which microinsurance is accessible via the selected MFIs. We, therefore, acknowledge that our results might be replicable in any villages with rural and semi-urban context in Sri Lanka besides large cities or very remote areas without access to microfinance at all. We assume that the generalization goes beyond the survey areas, even though external validity is not fully valid.

As Yasiru Mutual Fund and Sanasa Insurance Company, two of the covered MFIs, are the exclusive insurance providers, we chose the non-insured clients not from the client base of the MFIs directly, but via a list of households received from existing CBOs, which are not linked to the respective MFI, in the villages according to limited financial resources for the survey. The non-insured clients were randomly selected from households of one CBO in each village where the survey is conducted. This CBO is picked by chance from a list of existing CBOs in each village with the help of the branch manager and the staff members of the MFIs in the district.

Therefore, the number of total households -insured and non-insured- selected from the villages linked to one of the five institutions ranges from 40 to 95 depending on the number of districts in which the MFIs operate, so that only 40 clients were linked to WDF, which operates in one district (i.e., Hambantota), while 95 clients were associated with SEEDS, which operate in all the districts in the country. 65 clients were related to each of the other three institutions (i.e., WDF, WDBF and Sanasa).

The sampling was done using two strata of households that were insured by one of the covered MFIs and that were not insured at all. Out of the 330 households, 240 households have bought and 90 have not purchased any microinsurance. Further, 209 households have taken up a credit, and 200 contracted any savings product in the past five years, so that they might be linked to a MFI beside insurance. We include appropriate weights in the estimations to control for different sampling probabilities.

The survey questionnaire contained details on demographic and socioeconomic household characteristics, household assets, the occurrence of shocks, risk management strategies, evaluation of household's risk self assessment and situation. Special focus is given on information about the integration of households in the financial market, and the use of loans, savings products and in particular, insurance. All analyses were performed in Intercooled Stata 9.0. In the estimations, the vector of explanatory variables includes a household's self perception towards the risk index as continuous variable, eight risk exposure dummies, and different household characteristics including demographic and wealth variables as control variables, education, economic activities of the household head, the distance to road as an access to market indicator and information about

remittances.[8]

Table 1. Summary Statistics: Use of No, One, Two or Three Microfinancial Services

Variable	No service		One		Two		Three	
	Mean	Std. error	Mean	Std. error	Mean	Std. error	Mean	Std. error
Risk Assessment	0.146	0.309	-0.246	0.066	-0.006	0.114	0.061	0.100
Drought	0.057	0.041	0.146	0.043	0.109	0.025	0.115	0.027
Animal Threat	0.026	0.026	0.097	0.039	0.066	0.021	0.087	0.026
Crop Failure	0.031	0.031	0.041	0.027	0.051	0.018	0.102	0.029
Death	-	-	0.044	0.035	0.075	0.025	0.082	0.027
Illness	0.152	0.077	0.063	0.037	0.121	0.028	0.187	0.037
Input	0.094	0.444	0.197	0.049	0.095	0.024	0.275	0.044
No Ability to Sell Agricultural Products	-	-	0.080	0.038	0.058	0.021	0.129	0.033
Other Risk	0.072	0.031	0.055	0.023	0.072	0.023	0.089	0.028
Female Head	0.146	0.082	0.191	0.049	0.147	0.033	0.155	0.036
Household Size	3.906	0.228	3.750	0.202	4.034	0.113	4.310	0.135
Age	50.47	2.345	45.47	1.832	46.88	1.007	48.337	1.096
Age Squared	2669.1	240.95	2233.3	171.16	2317.2	98.17	2461.9	109.51
No or Primary Education	0.272	0.093	0.162	0.049	0.153	0.032	0.188	0.038
Secondary Education	0.467	0.107	0.415	0.067	0.376	0.045	0.363	0.046
Head is Selfemployed	0.614	0.106	0.633	0.059	0.571	0.046	0.558	0.048
Head is Unemployed	0.272	0.093	0.248	0.063	0.179	0.036	0.241	0.043
Distance to Road	721.14	241.11	664.64	149.25	307.86	69.91	180.05	27.89
Remittance	0.031	0.031	0.072	0.039	0.027	0.014	0.069	0.025
Land Ownership	0.516	0.104	0.665	0.060	0.748	0.041	0.895	0.030
Asset Index	-0.863	0.125	0.053	0.129	-0.069	0.092	0.353	0.088
Observations	26		67		129		108	

Source: Authors' calculation.

In relation to the dependent variable summary statistics for the sample are presented in Table 1. The descriptive statistics are presented in relation to the categories of the dependent variable used in the estimations of the ordered probit model, namely non-users of microfinancial services, users of one, two or three microfinancial services.

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[8] Table 6 in Appendix shows the definition and specific details of each variable's construction used as independent variable. To test for potential problems of multicollinearity, we computed the pairwise correlations between the explanatory variables, for the correlation matrix of the explanatory variables, see Table 11 in Appendix. We calculated the variance inflation factors (VIFs) using the *collin* command in Stata. Except for the regressors "age" and "age squared" all VIFs were less than 2.21. Therefore, we see no reason for concern.

In order to capture household's household's attitude towards risk as a proxy for household's degree of risk aversion, we include a variable which covers household's self perception towards risk to a range of risks.[9]

The non-users of financial services report the highest score of risk assessment, followed by the users of three services, the users of two and one services. Related to the risk exposure experienced by the household in the past five years, we control for eight different dummy variables in our analysis. These variables capture the most severe risks households faced in Sri Lanka in the past five years. In self reported rankings from the survey data, the households in Sri Lanka report war and terrorism (19%) as the most important peril they face in the future; a dramatic increase of input prices (18%), serious illness of a working adult household member (8%) are cited second and third most frequently, followed by drought (8%). The variable takes the value of 1 if a household experienced a severe shock during the previous five years and this had severe consequences and 0 otherwise.[10] The dummy variables indicate if a household experienced a severe drought, animal threat, crop failure, death of a household member, illness of a household member, an increase of input prices, the inability to sell agricultural products, and any other severe shock during the last five years. This category captures mostly idiosyncratic shocks, which may occur beside the hazards already covered by the other seven risk categories. Besides these variables, illness of a household member and any other severe shock, a higher share of the users of one, two or three financial services report the incidence of severe shock than the non-users of financial services.

An asset index constructed via factor analysis and a dummy variable for land ownership are considered as proxies for the wealth status of a household.[11] Further, we add asset quintile dummies in one estimation to investigate the households that use any financial services in relation to their wealth status. A higher share of the users of one, two or three financial services related to the non-users of financial services own any land compared to the full sample. The users of three financial services have the highest asset endowment, followed by the users of two and one financial service. The non-users

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[9] The index is constructed from three questions related to the household's self perception of subjective exposure to health shocks, road or work accidents, and economic shocks compared with neighbouring households and one question about household's own rating of willingness to take risks using factor analysis. We cannot take risk aversion into account in our analysis, as suggested by the literature on insurance demand, since experimental methods used to measure personal risk aversion were not included in our survey and related standardized questions in our survey questionnaire only reflect this in a limited way.

[10] Severity is measured in the sense that the household needed more than one month to recover economically from this respective shock.

[11] We controlled if any financial services are used to any asset, such as construction loans. These assets are neglected in the asset index, by doing so, we avoid potential problems of endogeneity. Land is generally not an as easily purchasable assets as other assets, so the influence of endogeneity can be neglected.

present the lowest asset endowment score. The users of financial services are generally better off households than the non-users in the communities surveyed. The data set in general, but especially the demographic and wealth data confirm that the sample consists of poor and middle-income households. The majority of households are engaged in low-income economic activities such as small-scale industrial businesses, petty trading and farm activities at the subsistence level. Around 20 percent of household heads have no formal or only primary education, whereas 40 percent of households heads report that they attained secondary education. Around 60 percent of the household heads are self-employed or contractual workers in either agriculture or non-agricultural activities, whereas around 20 percent of heads are not employed due to young or old age, disability, or similar reasons. The influence of the household size on the usage of financial services depends highly on the composition of the households.[12] However, larger households have here a high number of children and elderly people, but more economically active adult household members as well. On average, we find that households that use two or three financial services have more members in their households than non-users of financial services. The variable of age of the household head shows that the users of no financial services are significantly older than the users of one, two, or three financial services.

3.2. Estimation Methods

The usage of the three alternative formal financial services, such as use of savings products, use of loans, and use of insurance, is estimated in the form of an ordered probit model on the alternatives, whether or not households used no financial services, only one, two or three financial services in the previous five years. Financial services, which are defined here as formally offered financial services, are services provided by the state bank, development bank, domestic private bank, foreign private bank, microfinance institution (MFI), insurance company and financial leasing company. Formal savings products include all formal financial services, which are voluntarily used for a savings purpose; for instance, savings accounts, current accounts or savings plans.[13] We control for that by excluding all savings products, which were compulsory or bound to any other formal financial service, so that users of formal savings products are only those households which aim for using such products for the genuine purpose of saving or safe storage of money. Formal loans include all loans taken up voluntarily from the mentioned institutions and not used for the purchase of any durable assets in the last five years. Formal insurance is confined to those types of insurance, which are offered by the

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[12] In our data set, household size correlates highly with the number of dependants (correlation coefficient of 0.79) and with the number of children (correlation coefficient of 0.49).

[13] The related question in the survey's questionnaire only mentioned savings and do not ask or distinguish any specific savings products.

microfinance institutions covered by the survey conducted and may be understood as private suppliers. Hence, the category includes mainly health and life insurances, but also many other types of insurances, such as other life cycle events insurance, vehicle insurance, old age annuities/pension, credit insurance,[14] crop insurance and property insurance, from the respective five different microfinance providing institutions in the sample.

Table 2 and 3 shows that the use for each of these services may be interrelated, as many of the households use several of these services simultaneously. Therefore, we first estimate an ordered probit model with a categorical dependent variable, which has the value 1 for "no financial service", 2 for "one financial service", 3 for "two financial services" and 4 for "all three financial services". Second, we measure the determinants of the combinatorial choices of financial services using ordered probit models with e.g., a categorical dependent variable, which has the value 1 for "no financial service", 2 for "only savings", 3 for "savings and loans" and 4 for "all three financial services".[15] The same is done for the five other possible combinations. All these estimations have in common that the outcomes are here ordered related to the quantity of financial services used by the household. Yet, these quantitative measures indicate important qualitative implications.

From the first category of "no financial services" to the latest category of "all three financial services", not only the quantity, but also the sophistication and complexity of the use of financial services increases gradually. For this type of dependent variable the ordered probability model is a suitable tool (Greene, 2003). The two alternative model types are the ordered logit and the ordered probit model, from which we choose to estimate the ordered probit model since the logit specification is only a trivial modification and appears to make virtually no difference in practice (Greene, 2003).

Table 2. Use of Savings Products, Loans and/or Insurance

Use of	Number of Households in the Sample
None	26
Savings Only	23
Credit Only	16
Insurance Only	28
Savings and Credit	133
Savings and Insurance	152
Credit and Insurance	168
Savings, Credit and Insurance	108
Total	330

Source: Authors' illustration.

[14] Credit insurances are not taken into account in this study, as these insurances are mostly not taken up voluntarily, but bounded to any credit or to the allowance of a credit.

[15] We are thankful to an anonymous referee pointing this out.

Table 3.   Use of No, Only One, Two or Three Financial Services

Use of	Number of Households in the Sample
None	26
One Financial Service	67
Two Financial Services	129
Three Financial Services	108
Total	330

Source: Authors' illustration.

The ordered probit model is built around a latent regression in the same manner as the binomial probit models and based on the following specification:

$$y^* = \beta'x + \varepsilon , \tag{1}$$

where x is the vector of explanatory variables set and ε is the disturbance term. As usual y^* is unobserved, but what we do observe is:

$$y = 0, \text{ if } y^* \leq 0, \tag{2}$$

$$y = 1, \text{ if } 0 < y^* \leq \mu_1, \tag{3}$$

$$y = 2, \text{ if } \mu_1 < y^* \leq \mu_2, \tag{4}$$

$$y = 3, \text{ if } \mu_3 \leq y^*. \tag{5}$$

This is a form of censoring. The $\mu's$ are unknown parameters to be estimated with β. The choice of the respondents follows a decision-making process, which depends on certain measurable factors, x, and certain unobservable factors, ε. In the ordered probit model ε has a standard normal distribution. The probability of observing outcome i corresponds to the probability that the estimated linear function, plus random error, is within the range of the cut-points estimated the outcome:

$$\Pr(y = 0) = \Phi(\kappa_0 - \beta'x + \mu_0), \tag{6}$$

$$\Pr(y = 1) = \Phi(\kappa_1 - \beta'x + \mu_1) - \Phi(\kappa_0 - \beta'x + \mu_0), \tag{7}$$

$$\Pr(y = 2) = \Phi(\kappa_2 - \beta'x + \mu_2) - \Phi(\kappa_1 - \beta'x + \mu_1), \tag{8}$$

$$\Pr(y = 3) = 1 - \Phi(\kappa_3 - \beta' x + \mu_3). \tag{9}$$

μ_j is assumed to be normally distributed in ordered probit. In either case, one estimates the coefficients $\beta_1, \beta_2, ..., \beta_k$ together with the cut-points $\kappa_0, \kappa_1, \kappa_2, \kappa_3$. κ_0 is taken as $-\infty$ and κ_3 is taken as $+\infty$. All of this is a direct generalization of the ordinary two-outcome probit model.

4. ESTIMATION RESULTS AND INTERPRETATION

In Table 4 and 5, we estimate an ordered probit model on the uptake of none, one, two or three financial services to derive which role financial services can play in terms of risk mitigation and financial capability in Sri Lanka.[16] The categorical dependent variable is 1 if a household does not use any financial service, 2 if a household uses one financial service, 3 if a household uses two financial services, or 4 if a household uses three financial services.[17] In Table 5, we replace in the ordered probit regression the explanatory variable "asset index" with five asset quintiles indicating household's relative wealth status rank in terms of asset endowment to investigate if the poor have access to financial services or if financial service providers successfully target the poor. In comparison, we present regression estimates of ordered probit models for the use of specific combinations of financial services (Table 8, 9 and 10).[18]

We find that households, who perceived themselves more exposed to risk, are more likely to request three financial services. Furthermore, we find that those households are significantly less likely to use no financial service. Table 8 shows a positive association with household's participation in all three of them, after first adding insurance to the savings category and then followed by credit. This indicates that the uptake of financial services increases with household's self perception towards risk, so that households may

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[16] Because of the underlying cross-sectional survey data, we treat cautiously any causality of the estimation outcomes due to the inability to control for heterogeneity or potential reverse causal relationships. Further, it is important to note that our findings include potential endogeneity problems, as omitted explanatory or third factor variables influences as well the outcomes and explanations shown here.

[17] The coefficients are normalized to reflect the marginal effect of a one-unit change in the explanatory variable on the probability of financial service uptake. We calculated the marginal effects at the evaluated mean of the regressors for the ordered probit estimation using the mfx command for the different outcome categories in Stata (Bartus, 2005; Cameron and Trivedi, 2009).

[18] These findings give an indication what the determinants of the use of specific combinations of financial services are and can be used to add additional value to the discussion of the main ordered probit results. In addition, we estimate separate probit regressions of the determining factors of the uptake of savings products, loans and insurance (see Table 7 in the Appendix).

not link financial service uptake with an additional risk. It seems that household heads to use different combinations of financial products related to their financial capability level as a reaction of the incidence of a peril. The poor are obviously more exposed to risks, so it appears that they have a higher incentive to secure against future shocks and thus, have a higher probability to uptake any financial service, which is still constrained by a limited access to financial services.

Table 4. Ordered Probit Model on the Uptake of Financial Services (I)

Variable	No Service Marginal Effects	One Marginal Effects	Two Marginal Effects	Three Marginal Effects
Household's Self Perception Towards Risk	-0.0131*	-0.0250	-0.0033	0.0414*
Drought	0.0143	0.0255	0.0012	-0.0411
Animal Threat	-0.0063	-0.0124	-0.0022	0.0209
Crop Failure	0.0164	0.0287	0.0008	-0.0459
Death	-0.0374**	-0.0911**	-0.0462	0.1748*
Illness	-0.0407***	-0.0956***	-0.0435	0.1797***
Input	-0.0197	-0.0409	-0.0102	0.0709
No Ability to Sell Agricultural Products	-0.0427***	-0.1078**	-0.0625	0.2129*
Other Risk	-0.0074	-0.0147	-0.0027	0.0249
Female Head	-0.0051	-0.0099	-0.0016	0.0166
Household Size	-0.0047	-0.0090	-0.0012	0.0149
Age	-0.0059	-0.0114***	-0.0015	0.0189
Age Squared	0.00007	0.0001***	0.00002	-0.0002
No or Primary Education	0.0054	0.0101	0.0011	-0.0165
Secondary Education	0.0009	0.0018	0.0002	-0.0029
Head is Selfemployed	0.0171	0.0333	0.0053	-0.0557
Head is Unemployed	0.0176	0.0316	0.0018	-0.0510
Distance to Road	0.00001	0.00002	2.68e-06	-0.00003
Remittance	-0.0215	-0.0472	-0.0153	0.0839
Land Ownership	-0.0685**	-0.1037***	0.0119	0.1603***
Asset Index	-0.0342***	-0.0653	-0.0087	0.1082***
Observations	330			

Source: Authors' calculation.

Notes: Ordered probit model. Coefficients normalized to display marginal effects at sample mean. The asterisks indicate level of significance (Robust z-statistics): *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

The experience of specific hazards in the past is associated with the probability of the uptake for one, two or three financial services (Table 4). The same is true for the the combinations of financial services. We confirm that after a death experience household

are significantly less likely to use no financial service or one financial service, but more likely to request all three financial services. The outcomes for the second savings category (Table 8), both estimations of the insurance category (Table 9), and for the second loan category (Table 10) confirm this finding. The same result appears in the case of severe illness of a household member. The occurrence of the inability to sell agricultural products in the past five years is negatively associated with the usage of no or one service, but positively with the request for three financial services. The same is true for the combinations of the insurance category (Table 9) and if insurance is first added in the savings (Table 8) and loans category (Table 10). This points out that households uses a more diversified pool of financial services as risk coping mechanisms after the experience of certain shocks.

The death and severe illness of a household member as both family related and idiosyncratic hazards may covered by respective financial services, in the case of savings and insurance if these services were contracted before the incidence of the risk (Table 8 and 9). Further, credit may be unable to cover long-term costs of permanent shocks, so it is likely that credit covers, for instance, funeral expenses, but not the monthly income streams in the case of the breadwinner death. In the experience of severe illness in the past the households are significantly less likely to use the combination of loan and insurance (Table 10). The inability to sell agricultural shocks can rather be an idiosyncratic or aggregate hazard depending on the reason for the inability to sell. In sum, it is important to note that high-risk households may be more likely to participate in multiple financial services in advance, which may lead to adverse selection problems in the insurance market. Nevertheless, there is significant evidence for the association between financial behavior and the past risk exposure of the households.

In the following, we emphasize the statistically significant control variables covering more characteristics of the household's decision for the use of financial services. We find that larger households are more likely to access the financial market and use loans or insurance (Table 7), as they are more concerned to protect their members from possible harm. Remarkably, it seems that larger households have more economically active adult as household members indicating higher financial resources of those households in Sri Lanka.

There is a life-cycle effect for credit uptake (Table 7) and for the uptake of all three financial services, but the latter are not significant (Table 4). This indicates that household heads with increasing age are less financial capable of use a more diversified set of financial services than their younger counterparts, or are restricted from the access to them. However, we find that age has significantly negative relation with the uptake of one service (Table 4 and 5).

Household heads with no formal, primary or secondary education are significantly more likely to use no, one or two financial services or respectively are excluded from the uptake of all three financial services than their better educated counterparts, whereas the marginal effects are not statistically significant. Remarkably, we find that household

heads with no formal, primary or secondary education are significantly less likely to request savings or loans (Table 7). Households heads' lower educational attainment limits their abilities to understand and apply for such services (i.e., a lower financial capability), their perception as possible risk coping strategies and as well increase mistrust and risk perception according to the participation in microfinance services and institutions. Furthermore, they might be excluded due to lower income earning abilities and a respective lower socioeconomic status.

Table 5. Ordered Probit Model on the Uptake of Financial Services (II)

Variable	No Service Marginal Effects	One Marginal Effects	Two Marginal Effects	Three Marginal Effects
Household's Self Perception Towards Risk	-0.0141*	-0.0274	-0.0036	0.0452**
Drought	0.0225	0.0391	0.0002	-0.0618
Animal Threat	-0.0025	-0.0049	-0.0007	0.0082
Crop Failure	0.0127	0.0229	0.0011	-0.0367
Death	-0.0354**	-0.0863*	-0.0417	0.1635*
Illness	-0.0406***	-0.0967***	-0.0443	0.1816***
Input	-0.0206	-0.0436	-0.0111	0.0753
No Ability to Sell Agricultural Products	-0.0455***	-0.1194***	-0.0761	0.2410**
Other Risk	-0.0045	-0.0089	-0.0015	0.0148
Female Head	-1.29e-06	-2.5e-06	-3.31e-07	4.13e-06
Household Size	-0.0053	-0.0104	-0.0013	0.0168
Age	-0.0054	-0.0104***	-0.0014	0.0171
Age Squared	0.00006	0.0001***	0.00002	-0.0002
No or Primary Education	0.0078	0.0146	0.0014	-0.0237
Secondary Education	0.0029	0.0057	0.0007	-0.0093
Head is Selfemployed	0.0149	0.0293	0.0046	-0.0488
Head is Unemployed	0.0160	0.0293	0.0018	-0.0472
Distance to Road	9.21e-06	0.00002	2.31e-06	-0.00003
Remittance	-0.0229	-0.0516	-0.0177	0.0923
Land Ownership	-0.0679**	-0.1039***	0.0119	0.1599***
Quintile 1	0.1073**	0.1418***	-0.0354	-0.2137***
Quintile 2	0.0759**	0.1113***	-0.0178	-0.1694***
Quintile 3	0.0061	0.0115	0.0012	-0.0187
Quintile 4	-0.0062	-0.0124	-0.0020	0.0207
Observations	330			

Source: Authors' calculation.

Notes: Ordered probit model. Coefficients normalized to display marginal effects at sample mean. The asterisks indicate level of significance (Robust z-statistics): *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

As we expected, the household's socioeconomic status is highly related to the participation in financial services in Sri Lanka. We find that households in possession of any land are significantly less likely to use no or one financial service and more likely to request two and three financial services, whereas only the latter is statistically significant. The same is true for households with a higher asset endowment (Table 4). In Table 8, 9 and 10, there is evidence that the poor have a lower accessibility to use specific combinations of the three financial services. In line with the literature, this indicates that microfinancial services are so far not able to target the poorest households adequately or rather the poorest have no or only limited access to such financial services in Sri Lanka (Hulme and Mosley, 1997; Navajas *et al*., 2002; Datta, 2004).

Regarding the five asset quintiles (Table 5), households in the two poorest quintiles (Quintile 1 and 2) are significantly more likely to be excluded from the use of financial services, but less likely to use two or three financial services compared to the households in the wealthiest (fifth) quintile, whereas only the latter is statistically significant. Exclusion can appear voluntarily or involuntarily. However, it is rather unlikely that the poor choose not to use financial services. Rather, it appears that they might not use financial services due to religious or cultural reasons or to lower financial capability levels. It seems that the poor miss a basic level of financial capability for the participation in financial schemes or (World Bank, 2008). Importantly, they might be as well excluded from the use of financial services concerning specific requirements of the providers like price or non-price barriers, the underlying contractual or informational frameworks, discrimination against certain population groups or the fact that they are considered to be non-bankable because of lacking or irregular income or considered to be too high risk (World Bank, 2008).

5.   CONCLUSIONS

Microfinancial services are promising measures to serve low-income households with different options to cope with risks in the occurrence of severe hazards. Therefore, we argue that, in particular, the more diversified participation, i.e., the use of different types of financial services, holds the promise to adequately address the financial needs of the households according to the consequences of certain risks. It is the objective of this paper to contribute to the literature on the determinants of households' participation in microfinancial services by analyzing household's decision to use no, only one, two or all three different financial services. Using an ordered probit model, the estimation procedure allows the following investigations, if a past shock experience of a household is associated with the use of financial services, and if households identify financial services as possible risk coping mechanisms in Sri Lanka.

We confirm that the probability to uptake financial services, i.e., the request for all three financial services, increases with rising household's self perception towards risk. In contrast to Giesbert *et al*. (2011) and Giné *et al*. (2008), it seems that households may

not link financial service uptake with an additional risk, so that households assess the MFIs in Sri Lanka as reliable. It is plausible that combinations of different financial products play a key role, as a more diversified portfolio of coping mechanism leads to a better assurance against future harm. Even though the poor are more in need to secure against possible risk consequences, the access to financial services is still limited for them. Policy makers have to set the right legal frameworks and incentives to overcome these constraints and reach a higher geographical coverage and diversity in the financial and microfinance market.

Remarkably, the correlates of the eight dummy variables representing the households' risk exposure in the past five years give a manifold picture. It appears that the probability of the uptake for one, two or three financial services is associated with the experience of specific hazards in the past. The experience of a death, a severe illness of a household member or an inability to sell agricultural products, is positively associated with the participation in all three financial services. It depends on the type of risk, i.e., permanent or transient, if the costs of the shock can efficiently be covered by respective financial services. Therefore, financial services might be achievable and efficient risk management mechanisms in Sri Lanka. Beyond our valuable insights, future research would be necessary to estimate the causal impact of risk exposure on financial behavior taking the exact date of risk incidence and contract of financial services into account.

We elaborate some different and new implications of particular relevance for the discussion on factors determining the participation in microfinancial services. In larger households, heads are more likely to request credit or insurance according to higher incentives for the protection of the household.

Lower educational attainment is negatively associated with the use savings or credit, which indicates a missing basic level of financial capability among them. Finally, microfinancial services are so far not able to reach the poorest, and the access to finance is still limited for them in Sri Lanka. It is rather unlikely that the poor choose voluntarily not to use financial services due to their high-risk exposure. On the one hand, there are some households among the poor who neglect the use of financial services in respect to religious or cultural reasons. However, on the other side the majority of the poor is still excluded from financial markets because of supply-side constraints and their poor understanding of financial services.

In future, we hope to see further research on the financial capability level using a more holistic concept of financial capability for further analyses of microfinancial services. It would be desirable that policy makers promote household's financial capability by increasing the public awareness for these issues and implementing financial educational campaigns. However, simple and easily understandable products and more detailed, educational information about product details, duties and rights of the clients are urgently demanded from the MFIs to empower the poor in use microfinancial services.

APPENDIX

Table 6. Definition of Explanatory Variables

Variable	Description
Household's Self Perception Towards Risk	Household's assessment of risk own risk situation (subjective exposure to health shocks, road or work accidents, and economic shocks compared with neighbours, own rating of willingness to take risks), index created by factor analysis
Drought	Dummy variable, 1 if household experienced a drought in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Animal Threat	Dummy variable, 1 if household experienced a animal threat in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Crop Failure	Dummy variable, 1 if household experienced a crop failure in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Death	Dummy variable, 1 if household experienced the death of a household member in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Illness	Dummy variable, 1 if household experienced the illness of a household member in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Input	Dummy variable, 1 if household experienced an increase of input prices in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
No Ability to Sell Agricultural Products	Dummy variable, 1 if household experienced the shock that the household was not able to sell agricultural products in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Other Shock	Dummy variable, 1 if household experienced a severe shock other than the previous described shock in the last five years and this shock had serious consequences, i.e., household needed more than one month to recover, 0 otherwise
Household Size	Household size
Age	Age of the household head
Age Squared	Age of the household head squared
No or Primary Education	Dummy variable, 1 if household has no or only primary education, 0 otherwise
Secondary Education	Dummy variable, 1 if household has secondary education, 0 otherwise
Self Employed	Dummy variable, 1 if household head is self-employed or contractual worker in either agriculture or non-agricultural activities, 0 otherwise
Not Employed	Dummy variable, 1 if household head is not employed due to young or old age, disability, or similar reasons, 0 otherwise

Head is Farmer	Dummy variable, 1 if household head is engaged in any farm activities, 0 otherwise
Distance to Road	Distance to nearest access road in meter
Remittances	Dummy variable, 1 if household receives remittances from former household members who have migrated, 0 otherwise
Land	Dummy variable, if the household owns any land, 0 otherwise
Assets	Assets index
Quintiles 1 - 5	Five asset index quintiles labeled as Quintile 1 to 5, Quintile 1 is the poorest quintile and Quintile 5 is the quintile of households with the highest asset endowment. Dummy variables, 1 if household belong to the asset index quintile, 0 otherwise. (Quintile 5 functions as reference category)

Source: Authors' illustration.

Table 7.   Outcome of Separate Probit Models for the Use of Financial Services

Variable	Use of Savings Marginal Effects	Use of Loans Marginal Effects	Use of Insurance Marginal Effects
Household's Self Perception Towards Risk	0.323***	0.614***	0.003***
Drought	-0.773***	0.107	-0.001
Animal Threat	0.518***	0.151	-0.001
Crop Failure	0.190	0.722***	-0.003**
Death	0.409***	-0.360***	0.217
Illness	0.451***	-0.232	0.0001
Input	-0.946***	-0.404***	-0.003*
No Ability to Sell Agricultural Products	0.414***	0.702***	0.019
Other Risk	0.104	0.763***	-0.004***
Female Head	0.278	0.881***	0.009
Household Size	-0.106	0.147***	0.004***
Age	0.131	0.214***	-0.002***
Age Squared	-0.002*	-0.002***	0.00002**
No or Primary Education	-0.821***	-0.492***	0.123
Secondary Education	-0.725***	-0.239*	0.009*
Head is Selfemployed	0.392	-0.970***	0.002
Head is Unemployed	0.627***	-0.649***	0.0003
Distance to Road	-0.0004	0.0008***	0.000002
Remittance	-0.639***	0.569**	0.048
Land Ownership	0.947***	0.392***	0.003
Asset Index	0.221	0.309***	0.012***
Observations	330	330	330

Source: Authors' calculation.

Notes: Probit models. Coefficients normalized to display marginal effects at sample mean. The asterisks indicate level of significance (Robust z-statistics): *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Table 8-1. Ordered Probit Model on the Uptake of Financial Services in the Savings Category

Variable	None	Savings Only	Savings and Loan	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0217	-0.0198	-0.0124	0.0539
Drought	-0.0024	-0.0022	-0.0014	0.0059
Animal Threat	-0.0226	-0.0224	-0.0153	0.0603
Crop Failure	0.0718	0.0527	0.0251	-0.1496
Death	-0.0228	-0.0226	-0.0154	0.0609
Illness	-0.0866***	-0.1007***	-0.0846**	0.2719***
Input	-0.0432	-0.0436	-0.0306	0.1174
No Ability to Sell Agricultural Products	-0.0607	-0.0696	-0.0562	0.1867
Other Risk	0.0168	0.0146	0.0085	-0.0399
Female Head	-0.0399	-0.0409	-0.0291	0.1099
Household Size	-0.0119	-0.0109	-0.0068	0.0296
Age	-0.0072	-0.0067	-0.0041	0.0181
Age Squared	0.00009	0.00009	0.00006	-0.0002
No or Primary Education	0.0035	0.0031	0.0019	-0.0085
Secondary Education	-0.0011	-0.0009	-0.0006	0.0027
Head is Selfemployed	0.0327	0.0307	0.0198	-0.0832
Head is Unemployed	0.0139	0.0123	0.0074	-0.0336
Distance to Road	0.00004	0.00003	0.00002	-0.00009
Remittance	-0.0501	-0.0563	-0.0443	0.1507
Land Ownership	-0.1678***	-0.1031***	-0.0394***	0.3103***
Asset Index	-0.0902***	-0.0823***	-0.0515***	0.2245***
Observations	26	23	25	108

Table 8-2. Ordered Probit Model on the Uptake of Financial Services in the Savings Category

Variable	None	Savings Only	Savings and Insurance	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0232*	-0.0210*	-0.0201	0.0644*
Drought	-0.0262	-0.0259	-0.0283	0.0804
Animal Threat	0.0029	0.0026	0.0024	-0.0079
Crop Failure	0.0489	0.0378	0.0280	-0.1148
Death	-0.0648***	-0.0774**	-0.1122	0.2544**
Illness	-0.0352	-0.0352	-0.0390	0.1094
Input	-0.0549**	-0.0573*	-0.0683	0.1806*
No Ability to Sell Agricultural Products	-0.0742***	-0.0905**	-0.1374*	0.3022**
Other Risk	-0.0095	-0.0089	-0.0089	0.0272
Female Head	-0.0525*	-0.0561	-0.0689	0.1774

Variable				
Household Size	-0.0147	-0.0134	-0.0127	0.0409
Age	-0.0012	-0.0011	-0.0010	0.0033
Age Squared	0.00004	0.00003	0.00003	-0.0001
No or Primary Education	-0.0201	-0.0192	-0.0198	0.0592
Secondary Education	-0.0215	-0.0198	-0.0195	0.0608
Head is Selfemployed	0.0247	0.0228	0.0225	-0.0701
Head is Unemployed	-0.0049	-0.0045	-0.0044	0.0139
Distance to Road	0.00002	0.00001	0.00001	-0.00004
Remittance	-0.0686***	-0.0864*	-0.1357	0.2907*
Land Ownership	-0.0819	-0.0600*	-0.0411**	0.1831*
Asset Index	-0.0782***	-0.0709***	-0.0676***	0.2167***
Observations	26	23	44	108

Source: Authors' calculation.

Notes: Ordered probit model. Coefficients normalized to display marginal effects at sample mean. The asterisks indicate level of significance (Robust z-statistics): *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Table 9-1. Ordered Probit Model on the Uptake of Financial Services in the Insurance Category

Variable	None	Insurance Only	Insurance and Savings	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0120	-0.0111	-0.0071	0.0302
Drought	0.0569	0.0444	0.0206	-0.1220
Animal Threat	-0.0098	-0.0094	-0.0063	0.0255
Crop Failure	0.0026	0.0024	0.0015	-0.0065
Death	-0.0721***	-0.0905**	-0.0931	0.2558**
Illness	-0.0454	-0.0477	-0.0373	0.1304
Input	-0.0294	-0.0292	-0.0208	0.0794
No Ability to Sell Agricultural Products	-0.0719**	-0.0871*	-0.0857	0.2447*
Other Risk	-0.0311	-0.0321	-0.0245	0.0878
Female Head	-0.0348	-0.0357	-0.0268	0.0972
Household Size	-0.0095	-0.0088	-0.0056	0.0238
Age	-0.0028	-0.0026	-0.0016	0.0070
Age Squared	0.00004	0.00004	0.00002	-0.0001
No or Primary Education	-0.0260	-0.0258	-0.0184	0.0703
Secondary Education	-0.0003	-0.0003	-0.0002	0.0008
Head is Selfemployed	0.0213	0.0199	0.0129	-0.0542
Head is Unemployed	0.0365	0.0311	0.0171	-0.0848
Distance to Road	0.00001	0.00001	7.01e-06	-0.00003
Remittance	-0.0135	-0.0131	-0.0091	0.0357
Land Ownership	0.1205**	-0.0830***	-0.0302**	0.2337***
Asset Index	-0.0639***	-0.0592***	-0.0376***	0.1608***
Observations	26	28	44	108

Table 9-2. Ordered Probit Model on the Uptake of Financial Services in the Insurance Category

Variable	None	Insurance Only	Insurance and Loan	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0076	-0.0070	-0.0058	0.0204
Drought	0.0393	0.0325	0.0211	-0.0929
Animal Threat	-0.0360	-0.0383	-0.0406	0.1149
Crop Failure	0.0287	0.0243	0.0164	-0.0694
Death	-0.0715***	-0.0906***	-0.0134*	0.2959***
Illness	-0.0667***	-0.0753***	-0.0914**	0.2334***
Input	-0.0153	-0.0148	-0.0131	0.0431
No Ability to Sell Agricultural Products	-0.0507*	-0.0568	-0.0665	0.1740
Other Risk	-0.0147	-0.0144	-0.0131	0.0423
Female Head	-0.0120	-0.0115	-0.0102	0.0337
Household Size	-0.0007	-0.0006	-0.0005	0.0018
Age	-0.0124	-0.0115	-0.0095	0.0335
Age Squared	0.0001	0.0001	0.00009	-0.0003
No or Primary Education	0.0015	0.0014	0.0012	-0.0041
Secondary Education	0.0211	0.0193	0.0155	-0.0056
Head is Selfemployed	0.0287	0.0272	0.0233	-0.0791
Head is Unemployed	0.0473	0.0397	0.0268	-0.1139
Distance to Road	0.00002	0.00002	0.00002	-0.00006
Remittance	0.0196	0.0170	0.0122	-0.0487
Land Ownership	-0.1257**	-0.0868***	-0.0375**	0.2501***
Asset Index	-0.0536***	-0.0498***	-0.0411***	0.1445***
Observations	26	28	60	108

Source: Authors' calculation.

Note: See the Table 8's notes.

Table 10-1. Ordered Probit Model on the Uptake of Financial Services in the Loan Category

Variable	None	Loan Only	Loan and Savings	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0121	-0.0097	-0.0113	0.0331
Drought	0.0080	0.0063	0.0071	-0.0214
Animal Threat	-0.0349	-0.0319	-0.0426	0.1095
Crop Failure	0.0787	0.0503	0.0456	-0.1746
Death	0.0204	0.0153	0.0166	-0.0523
Illness	-0.0633***	-0.0599**	-0.0844*	0.2077**
Input	0.00007	0.00005	0.00006	-0.0002
No Ability to Sell Agricultural Products	-0.0646**	-0.0658*	-0.1005	0.2308*

Other Risk	0.0541	0.0372	0.0365	-0.1278
Female Head	-0.0207	-0.0175	-0.0215	0.0597
Household Size	0.0018	0.0015	0.0017	-0.0049
Age	0.0066	0.0053	0.0061	-0.0179
Age Squared	-0.00003	-0.00002	-0.00003	0.00007
No or Primary Education	0.0268	0.0202	0.0220	-0.0690
Secondary Education	-0.0014	-0.0012	-0.0013	0.0039
Head is Selfemployed	-0.0073	-0.0058	-0.0067	0.0197
Head is Unemployed	-0.0299	-0.0255	-0.0317	0.0872
Distance to Road	0.00002	0.00001	0.00002	-0.00005
Remittance	-0.0496	-0.0484	-0.0698	0.1678
Land Ownership	-0.2257***	-0.1125***	-0.0819***	0.4201***
Asset Index	-0.0889***	-0.0713***	-0.0827***	0.2428***
Observations	26	28	25	108

Table 10-2. Ordered Probit Model on the Uptake of Financial Services in the Loan Category

Variable	None	Loan Only	Loan and Insurance	Savings, Insurance and Loan
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Household's Self Perception Towards Risk	-0.0121	-0.0084	-0.0164	0.0368
Drought	-0.0044	-0.0031	-0.0061	0.0136
Animal Threat	-0.0476*	-0.0394	-0.1067	0.1937
Crop Failure	0.0809	0.0446	0.0572**	-0.1827
Death	-0.0552***	-0.0473**	-0.1379	0.2403**
Illness	-0.0676***	-0.0558***	-0.1554***	0.2787***
Input	-0.0193	-0.0139	-0.0296	0.0628
No Ability to Sell Agricultural Products	-0.0670***	-0.0593***	-0.1880**	0.3144***
Other Risk	0.0054	0.0037	0.0071	-0.0162
Female Head	-0.0038	-0.0027	-0.0054	0.0119
Household Size	0.0031	0.0022	0.0043	-0.0096
Age	-0.0058	-0.0039	-0.0078	0.0176
Age Squared	0.00007	0.00005	0.0001	-0.0002
No or Primary Education	0.0082	0.0056	0.0106	-0.0243
Secondary Education	-0.0098	-0.0068	-0.0136	0.0302
Head is Selfemployed	0.0163	0.0114	0.0228	-0.0505
Head is Unemployed	-0.0088	-0.0062	-0.0125	0.0275
Distance to Road	0.00001	8.7e-06	0.00002	-0.00004
Remittance	-0.0195	-0.0145	-0.0321	0.0659
Land Ownership	-0.1373***	-0.0710***	-0.0849***	0.2932***
Asset Index	-0.0663***	-0.0460***	-0.0902***	0.2025***
Observations	26	16	60	108

Source: Authors' calculation.

Note: See the Table 8's notes.

Table 11. Correlation Matrix of Explanatory Variables

Variables	Risk Assessment	Drought	Animal Threat	Crop Failure	Death	Illness	Input
Risk Assessment	1.00						
Drought	-0.03	1.00					
Animal Threat	0.05	0.47	1.00				
Crop Failure	0.06	0.14	0.17	1.00			
Death	0.02	-0.03	-0.04	0.05	1.00		
Illness	0.09	-0.02	-0.03	0.08	-0.0	1.00	
Input	-0.01	0.22	0.23	0.19	-0.04	-0.01	1.00
Agricultural Products	-0.03	0.49	0.28	0.21	-0.04	0.01	0.33
Other Shock	0.01	-0.12	-0.09	-0.09	-0.09	-0.13	-0.15
Female Head	-0.01	0.06	0.10	0.02	0.18	-0.09	0.06
Household Size	0.04	-0.04	-0.05	0.11	0.01	0.13	0.04
Age	0.15	-0.02	0.03	0.00	0.02	0.10	0.03
Age Squared	0.17	-0.02	0.02	0.02	0.03	0.11	0.03
No or Primary	0.17	0.01	0.02	0.07	0.07	0.07	-0.01
Secondary	-0.08	0.00	-0.00	0.02	-0.07	0.07	0.02
Self Employed	-0.03	0.19	0.11	0.05	0.02	0.02	0.04
Not Employed	0.09	-0.13	-0.05	-0.01	0.02	0.05	-0.01
Distance	-0.02	-0.04	-0.09	-0.09	0.05	-0.05	-0.09
Remittance	-0.06	-0.00	0.13	0.09	-0.01	0.02	0.10
Land	0.03	0.19	0.08	0.13	0.07	-0.03	0.16
Assets	-0.12	-0.18	-0.14	0.14	-0.03	-0.03	0.08

Variables	Agricultural Products	Other Shock	Female Head	Household Size	Age	Age Squared	No or Primary
Risk Assessment							
Drought							
Animal Threat							
Crop Failure							
Death							
Illness							
Input							
Agricultural Products	1.00						
Other Shock	-0.09	1.00					
Female Head	-0.01	0.04	1.00				
Household Size	0.06	0.10	-0.25	1.00			
Age	-0.01	-0.08	0.17	0.0975	1.00		
Age Squared	-0.02	-0.07	0.16	0.08	0.98	1.00	
No or Primary	0.06	0.02	0.13	0.15	0.36	0.37	1.00
Secondary	0.03	-0.00	-0.02	0.00	-0.01	-0.03	-0.40
Self Employed	0.15	0.02	-0.04	0.05	-0.11	-0.13	0.04
Not Employed	-0.08	0.05	0.19	-0.01	0.34	0.37	0.17

Distance	-0.01	-0.00	-0.03	-0.16	-0.13	-0.12	0.01
Remittance	-0.02	-0.03	0.22	-0.03	0.18	0.19	0.17
Land	0.16	0.06	0.03	0.08	0.06	0.06	0.04
Assets	-0.01	-0.01	-0.11	0.11	-0.03	-0.03	-0.19

Variables	Secondary	Self Employed	Not Employed	Distance	Remittance	Land	Assets
Risk Assessment							
Drought							
Animal Threat							
Crop Failure							
Death							
Illness							
Input							
Agricultural Products							
Other Shock							
Female Head							
Household Size							
Age							
Age Squared							
No or Primary							
Secondary	1.00						
Self Employed	0.04	1.00					
Not Employed	-0.03	-0.65	1.00				
Distance	-0.08	0.17	-0.10	1.00			
Remittance	-0.08	-0.03	0.11	-0.04	1.00		
Land	-0.15	-0.05	0.028	-0.30	0.02	1.00	
Assets	-0.11	-0.11	-0.03	-0.14	0.02	0.07	1.00

Source: Authors' calculation.

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