

Participation in Microfinancial Markets: The Use of Insurance, Savings, and Credit in Rural Ghana

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Abstract:

This paper intends to add value to the discussion about households' participation in microfinancial markets of developing countries. It investigates the determinants of uptake of microinsurance, microsavings, and microloans, taking into account that households may use more than one service at a time. The analysis is based on household survey data, collected in two villages in the Central Region of Ghana. On the one hand, the estimation results confirm the common finding that poorer households are less likely to participate in the financial market than better-off households. On the other hand, there is empirical evidence that the use of insurance, savings products, and loans depends not only on the socioeconomic status of households but also on various other factors, such as households' risk assessment and past exposure to shocks.

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1 Introduction¹

In recent years, there has been a profound transition in the understanding of microfinance. Academics as well as practitioners have come to realize that “low-income households can profit through access to a broader set of financial services than just credit” (Armendáriz and Murdoch 2005: 147). Thus, after microcredit has long dominated the microfinance market², many financial institutions have now established deposit accounts—to the extent that the number of deposit accounts is more than double the number of outstanding loans in sub-Saharan Africa today (Lafourcade et al. 2005)³—and microinsurance has entered the market in many developing countries. Since microinsurance is still a relatively young phenomenon, its spread is rather limited. Although some form of microinsurance can be found in 77 out of the 100 poorest countries in the world (Roth et al. 2007), it is not very widely distributed within these countries. The number of microinsured people is estimated to 78 million worldwide, which is not a particularly high number; given that China and India – both with populations of above one billion – are among the 77 identified countries.⁴

Microinsurance has not been as extensively studied as microcredit and, to a lesser extent, microsavings. In particular, not much is known about what determines households’ participation in the microinsurance market even though this is one of the most crucial questions if greater coverage were to be achieved. It is the objective of this paper to throw some additional light into the matter by examining the determinants of microinsurance use. Yet, we do not consider insurance alone but take formal credit and formal savings products into consideration as well.⁵ This has two reasons. First, we argue that households’ choices for different financial services are interconnected. On the one hand, users of one service may simply

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² Zeller and Sharma (2002: 39) describe the scenario in the following way: “Whereas savings were called the forgotten half of finance during the 1980s [...] one may consider insurance the forgotten third of finance during the 1990s.”

³ The region has therefore been called the big “savings exception” (MIX 2007, Basu et al. 2004).

⁴ Of course, informal insurance has existed for many years and is in no way new. The mentioned study intended to include informally insured people, but their number is likely to be largely underestimated, as they are difficult to be identified due to the very nature of the respective arrangements. Hence, the reported low coverage rates mainly refer to semiformal and formal microinsurance.

⁵ For the sake of simplicity, we leave the “micro” aside and speak of financial services, insurance, credit, and savings products in the remainder of the paper. For the most part, the literature we review and the services we consider in the below estimations are of a microfinance nature.

have an informational advantage over nonusers in the sense that they either learn about additional services “by accident” when visiting their respective financial institutions or are deliberately approached and informed by bank staff. On the other hand, users may have a higher level of financial literacy than nonusers, that is, a better understanding of how financial services function, and may therefore better recognize the utility they may gain from using another service as well. In both cases, households using at least one service can be assumed to be more likely to start using an additional service – such as an insurance policy – than households using no service at all.

Second, and possibly more important, we argue that much is to be learned by investigating the three services together; precisely because we assume that households’ choices for one of them are interrelated. As will be shown below, a number of empirical studies have investigated what influences households’ participation in the growing financial sector in developing countries (Muradoglu and Taskin 1996, Jabbar et al. 2002, Pal 2002, Bhat and Jain 2006, Gine et al. 2008, Swain 2002, Barlund and Tarp 2008). Yet, most of these studies concentrate on one of insurance, loans, or savings products; and they usually do not relate to each other. Several determinants have only been considered in studies on households’ use of one of the services of the financial trinity, even though they may potentially influence the use of the respective other services as well. This is the decisive motivation for our analysis. We expect the determinants of the use of insurance, loans, and savings options to be similar, much more so than the existing literature suggests. Thus, based on a literature review, we aim at identifying such factors and empirically testing their relevance for all three financial services.

This is not to say that the effect of certain determinants is necessarily of the same magnitude and not even of the same sign for credit, savings products, and insurance uptake. In fact, this would be an implausible assumption since households’ motivations for using a financial service can be quite different, both for the same service and between the three services. As Zeller (2001) points out, financial services can be used for income generation on the one hand and for income and consumption smoothing on the other hand. Investment credit and savings deposits that earn interest income fall into the first category; insurance⁶, consumption credit, and short-term savings products into the second. To go a step further, while insurance and savings are *ex ante* – that is, preventive – strategies for consumption smoothing, consumption credit is typically used *ex post* to a calamity. Therefore, a household which has recently experienced a sudden drop in income due to a serious shock, such as illness or death of an income-earning household member, could be expected to be more likely to re-

⁶ Consumption smoothing is the standard rationale for purchasing insurance. However, whether households always have this rationale in mind when signing an insurance contract, especially in developing countries, may be questioned. For example, in the case of credit life insurance, which is a very common product in the microinsurance business, the main motivation may not be to mitigate future shocks, but rather to have access to credit. This type of insurance takes care of credit repayment if the borrower dies before the credit obligations are fulfilled and is often obligatory.

quest a loan but less likely to open a savings deposit or contract an insurance policy. The experiencing of a shock would then be positively correlated with credit uptake and negatively with the use of the other two services.

The empirical analysis in this paper is based on a survey of 350 Ghanaian households, some of which have purchased a micro life insurance (packaged with a hospitalization benefit, accident cover and optional investment plan) offered by the Gemini Life Insurance Company (GLICO). The survey was conducted by the authors in two neighboring villages (Brakwa and Benin) in the Asikuma/Odoben/Brakwa district of the Ghanaian Central Region in February 2008 in the context of a research project on the uptake of insurance in sub-Saharan Africa. In Ghana, as in many other developing countries, the financial market is highly fragmented (Aryeetey et al. 1997). Only 5 to 6 percent of the population are reported to have access to the commercial banking sector (Basu et al. 2004), while 16 percent have access to an account with a financial intermediary (World Bank 2008). Several providers outside of the commercial sector have evolved and are generally serving a larger share of the population, but access nevertheless remains restricted, particularly in rural areas. In fact, little is known in the academic and policy-making communities about the Ghanaian rural financial market and, especially, about what drives different types of households to use different types of financial services. A few related studies show a strong focus on informal credit sources and are partly further confined to the demand for finance by small enterprises (La Ferrara 2003, Schindler 2007). To our knowledge, an investigation of the determinants of rural households' use of insurance has not been undertaken.

The paper is structured as follows. Following this introduction, Section 2 offers a short review of the literature on the determinants of households' use of financial services in developing countries. Section 3 describes the data, introduces the explanatory variables, and discusses our expectations. The estimation strategy is presented in Section 4, and the results in Section 5. Section 6 concludes.

2 Literature Review

We here review the literature on the determinants of households' use of formal financial services in developing countries.⁷ Many of the authors in this review do not talk about the use of financial services but about demand for these even though this is not in all cases the correct term. Since the supply is generally restricted, not all households demanding a particular service will also be able to use this service.⁸ To acknowledge this fact, we exclusively

⁷ As mentioned above, most of the studies included here refer to microfinancial services. A few studies without an explicit microfinance focus are nevertheless included since they are of relevance for the question studied.

⁸ A range of authors have explicitly investigated the issue of access to financial services (e.g. Swain 2002, Zeller and Sharma 2002, Dehejia et al. 2005, Claessens 2006, World Bank 2008). Since the focus of this analysis is a different one, details are not presented here.

speak of participation or use throughout this paper. We begin with studies on insurance uptake, as this is the service of greatest interest to us, and complement the insights taken from these with findings from studies on savings and borrowing behaviour.

While there are numerous studies on the involvement of low-income households in informal insurance mechanisms (Townsend 1995, Morduch 1995, 1999, Dercon 2002, Churchill 2006), not much is known about their participation in (market-based) insurance.^{9,10} Studies on the determinants of health insurance membership (e.g. Wang and Rosenman 2006, Bhat and Jain 2006, Schneider and Diop 2004, Jütting 2003) clearly outnumber those on other types of insurance. To our knowledge, there is only one quantitative study that goes beyond health insurance: Gine et al. (2008) on rainfall insurance among small-scale farmers in India. Not surprisingly, all studies stress the positive influence of wealth-related factors as well as education on the use of insurance. In particular, education is found to relate to the ability of people to assess risk and the way insurance would mitigate it (Wang and Rosenman 2006). Beyond education as such, some authors find that the level of specific knowledge on insurance plays an important role (Gine et al. 2008, Bhat and Jain 2006) – pointing towards the general relevance of financial literacy in the adaptation of financial services.

Moreover, household demographic variables are usually analyzed. With regard to health insurance – although easily transferable to the case of life insurance – it is typically found that with rising household size and age of the household head the likelihood to participate increases (Wang and Rosenman 2006, Schneider and Diop 2004, Bhat and Jain 2006, Dror et al. 2007). Furthermore, factors that reflect a higher exposure towards the risk in question are found to have a positive relationship with the decision to take up insurance.¹¹ In this regard, Bhat and Jain (2006) find that higher health expenditures of households are correlated with an increased likelihood to buy health insurance. Similarly, Gine et al. (2008) find evidence that households historically planting higher shares of castor and groundnuts, for which the examined index-based insurance exists, are more likely to purchase a policy. In addition to that, proximity to the providing institution often exerts a significantly positive effect on the decision to take up insurance (Wang and Rosenman 2006, Schneider and Diop 2004); and the same is true for the inclusion in certain networks and familiarity with the insurance vendor (Gine et al. 2008, Jütting 2003). The latter is attributed to the fact that, in a context of limited knowledge and information on insurance, people are likely to draw inference about this service through the experiences with it within their networks as well as their trust in those who are selling it. Interestingly, Gine et al. (2008) find that risk aversion, in contrast to evidence

⁹ This paper concentrates on market-based provision of financial services and, therefore, does not entail reference to literature on public social security systems.

¹⁰ Given that many households lack adequate options to secure against shocks, several studies conclude that there must be high potential for microinsurance, but they do not investigate the determinants of the decision to purchase available insurance products (Loewe et al. 2001, Cohen et al. 2005, McCord et al. 2006).

¹¹ If insurers have limited information or ability to incorporate such factors in their actuarial calculations, this can lead to the typical problem of adverse selection in the respective insurance scheme.

from developed countries, does not lead to a higher probability of contracting insurance. This is explained by the uncertainty of the target households regarding insurance and their limited experience with it.

Similar to the case of insurance, academic research on savings behavior in developing countries has largely concentrated on informal savings options, such as rotating savings and credit associations (ROSCAs), or nonfinancial savings, such as livestock, stock of crops, or jewelry (Gurgand et al. 1994, Fafchamps et al. 1998, Kimuyu 1999, Aryeetey and Udry 2000, Hoogeveen 2003). Those studies focusing on the use of formal savings products often analyze the savings pattern over a lifetime and hence regard age as an important explanatory factor. They find that the determinants of savings demand in developing countries usually differ from those in developed countries and often contradict the theoretical assumptions of the life-cycle theory (Ando and Modigliani 1963, Deaton 1992, Spio and Groenwald 1996) or the permanent income hypothesis (Friedman 1957, Kelley and Williamson 1968, Gupta 1970, Muradoglu and Taskin 1996). For example, strong family ties seem to make it less necessary to save for future retirement, and remittances appear to influence the timing of savings within the life cycle of a household (Spio and Groenewald 1996). One of the few studies not concentrating on the testing of either of these theories is Kiiza and Pederson (2002). The authors show that the decision to hold a bank savings deposit in Uganda is positively related to the information available to the household on the respective banking system, the level of education and work experience of the household head, and the proximity to the financial institution. The level of net deposits is further influenced by credit availability, transaction costs, and the level of permanent income.

The bulk of studies on financial services deals with the use of credit. Many of these studies touch upon the issue of credit rationing in the formal financial market (Kochar 1997, Atieno 1997) and hence conduct a combined analysis of the demand for formal and informal loans (Pal 2002, Barslund and Tarp 2008). An important insight of these studies is that beyond the fact that banks manipulate access to formal credit by rationing, the probability that someone borrows from the formal sector, rather than from the informal one or not at all, is influenced by a range of distinct other factors. For example, a major motivation to take up a formal loan, much more so than for informal loans, is investment plans. This is reflected by the finding that greater land holdings or area of operational holdings, less wage-labor income, higher price of output, and different primary economic activities, which are associated with a higher need for capital in the household, are positively associated with the use of formal loans, which are hence geared towards production purposes and asset management (Barslund and Tarp 2008, Swain 2002, Pal 2002). Again, in all studies wealth and education have a large positive impact on the use of credit. Proximity and a range of socio-demographic household factors are found to perform similarly as in studies on insurance and savings products (Barslund and Tarp 2008, Jabbar et al. 2002, Pal 2002, Pitt and Khandker 2002). In addition, authors identify gender (Jabbar et al. 2002, Pal 2002, Barslund and Tarp 2007), sea-

sonal fluctuations in income (Pitt and Khandker 2002), training and prevalence of an outstanding loan (Jabbar et al. 2002), bad credit history (Barslund and Tarp 2008), and the interest rate (Swain 2002) as additional determinants of the use of credit. Zeller and Sharma (2002) point out that borrowing during adverse times is an integral part of the livelihood system of households in developing countries. This indicates that the experiencing of shocks should have an effect on the demand for loans, which is confirmed by Nguyen et al. (2002). They find that many borrowers in Burkina Faso do not take loans to start a new economic activity, but rather to supplement inadequate operating capital for their already running business or to restart an activity after a break which could have resulted from a shock.

As this review shows, the strands of literature focusing on the use of insurance, savings options, and credit in developing countries are rather distinct and do not relate very much to each other. On the one hand, there are variables, which have been tested in all the three strands presented. Among them are a) socio-demographic characteristics, such as age of the household head and household size; b) wealth-related factors, such as asset ownership; c) the level of education; and d) the (geographical) proximity to the financial institution. On the other hand, a range of variables have been studied for the use of only one or two of the financial services, although they are presumably of major relevance for the respective other service(s) as well. These are e) factors related to risk, such as the attitude of households towards risk and the experience of shocks, which have so far played a role only in the analysis of insurance uptake; f) remittances, which have only been incorporated in the studies on savings; g) the type of activity of the household (head), which has been considered in the credit and savings literature; h) trust, a factor that has received only marginal explicit attention in some of the insurance literature; i) supply side factors, such as the interest rate, which has especially been considered in studies on credit uptake; and j) gender of the household head, which has to our knowledge only been taken into consideration in the credit literature. Since we aim at investigating the three services together, we incorporate the combined insights from the cited literature. In our below estimations, we include both types of variables, to the extent possible.

3 Source of Data and Definition of Variables

As mentioned above, the household survey underlying our analysis was conducted in the context of a research project on the uptake of microinsurance. In an *ex ante* selection process, the Gemini Life Insurance Company (GLICO) had been identified as the only known insurance provider in sub-Saharan Africa offering voluntary insurance beyond health insurance to low-income households.¹² The Anidaso policy (Anidaso = Hope) provided by GLICO is an

¹² All other providers we were aware of had an insufficient number of clients at that time, offered only compulsory insurance, or provided no more than health or heavily subsidized agricultural insurance. In sub-Saharan

insurance product specifically targeted at low-income people both in urban and rural areas. At present, GLICO cooperates with 26 rural and community banks all over the country for the sale and distribution of the policy. The number of Anidaso clients per bank ranges from around 200 to over 1,000. The policy offers term life assurance up to age 60, accident benefits (income protection insurance with total/partial, temporary/permanent disability benefits lumped together), and hospitalization benefits (calculated per each day spent in the hospital) for the policy holder, the spouse, and up to four children. Contributions towards a so-called investment plan, which serves as a savings scheme and pays the accumulated account at the expiry of the term, can be added on a voluntary basis.

The specific survey area (Brakwa and Benin villages) was chosen because it guaranteed a high share of low-income people in the overall population¹³, offered a relatively high density of bank clients holding an insurance contract, and was relatively easily accessible. The Asikuma/Odoben/Brakwa district is a highly agrarian local economy with over 80 percent of the population being engaged in farm activities, mostly at the subsistence level and to a small extent in cash-crop cultivation (for example, cocoa). Activities outside farming are focused in small-scale industrial businesses and petty trading. In the two survey villages Brakwa and Benin, financial services are delivered by different entities, among them a rural and community bank, a commercial bank, and private insurance providers. The Brakwa Rural Bank, headquartered in Brakwa, provides savings products and loans with microfinance characteristics. In addition, the bank has been cooperating with GLICO in the distribution of the Anidaso policy since 2005. A branch of the Brakwa Rural Bank is located in the town of Asikuma in the same district, offering the same financial services as the head office. Furthermore, the Ghana Commercial Bank, the largest bank in Ghana, has a branch in Asikuma. It offers various types of savings products and loans. In addition to GLICO, the private insurance provider Donewell is represented in the area, offering different types of commercial insurance.¹⁴ The survey data show that at least one microfinance institution and one cooperative are active in the survey area as well. During our field visit, we did not become aware of these and hence do not know their names. We nevertheless include them here as service providers.

For a meaningful statistical analysis, a sufficient number of households using insurance was required in the sample. As the number of households participating in the Anidaso insurance

Africa, the provision of microinsurance is mostly confined to health insurance or compulsory credit life insurance. However, since information on microinsurance providers and products is still fragmentary, it may well be that there exist more voluntary microinsurance products besides GLICO's Anidaso policy that we do not know about.

¹³ The poverty headcount in the Central Region amounted to 19.9 percent in 2005/06. We assume that the poverty headcount was much higher than the regional average in the two villages where we conducted the survey due to the rural conditions found there.

¹⁴ The financial services offered by the Ghana Commercial Bank and Donewell Insurance are not microfinancial services in the narrow sense. They are nevertheless included because 1) loan and saving amounts as well as insurance premiums are generally not much higher than those offered by the Brakwa Rural Bank, and 2) they do not account for many of the financial services used in the two villages.

scheme was too small to be adequately represented in a random sample of the total population of the two villages, the sample had to be stratified according to insurance membership status. This included not only participation in the Anidaso scheme but also participation in other insurance schemes, such as the public National Health Insurance Scheme¹⁵ or those provided by Donewell. After listing all households in Brakwa and Benin, a total of 351 households were interviewed, including the three strata of microinsured households, other-insured households, and noninsured households. Households within each stratum were chosen through random sampling, except for the microinsured stratum, for which all households were interviewed. The varying sampling probabilities are controlled for by including according weights in the below estimations. The survey questionnaire contained detailed sections on demographic and socioeconomic household characteristics, household assets, the occurrence of shocks, risk management strategies, household attitudes towards risk, and household financial knowledge. Further, information was gathered on the embedding of households in different financial institutions and the usage of loans, savings products, and insurance. One household did not complete the entire questionnaire, which reduces the number of observations in our analysis to 350 households.

Table 1: Use of Microfinancial Services

	Number of households in the sample	Estimated number of households in the survey area	Estimated proportion in the survey area
None	164	1,275	62.44
Savings only	49	359	17.56
Credit only	1	9	0.43
Insurance only	9	14	0.67
Savings and credit	37	245	12.00
Savings and insurance	44	67	3.30
Credit and insurance	1	1	0.05
Savings, credit, and insurance	45	72	3.55
Total	350	2,042	100.00

Note: Households in the sample are weighted according to their sampling probabilities. This explains the discrepancy between the proportion of households in the different categories in the sample and the estimated proportion in the survey area.

Source: Authors' calculation.

In the below estimation, the three decision alternatives indicate whether or not households used savings options, credit, or insurance in the five pre-survey years. The insurance category is confined to those types of insurance, which are offered by private suppliers and thereby ex-

¹⁵ The National Health Insurance Scheme (NHIS) was launched in 2004 and replaced the cash-and-carry health-care system. It provides free of charge medical care at public hospitals, recognized private hospitals, and health centers for contributors, their dependents, and indigent people. The NHIS is well received, particularly in rural areas, where a majority of people had hitherto gone without health services altogether as a result of lacking resources and insurance alternatives.

cludes health insurance provided through the National Health Insurance Scheme. Hence, it mainly includes the Anidaso policy and a few other private insurance products with a premium range similar to Anidaso. The savings category includes savings accounts, current accounts (which are often used for the purpose of savings), and other savings products offered by the financial institutions named above. Users of savings options are only those households which can be identified as having intentionally decided to use such a product for the genuine purpose of saving or safe storage of money. This is important because some households were found to be “pseudo-savers” in the sense that they had opened a savings or current account as a precondition for receiving a loan or contracting insurance and had since not made use of their account for savings purposes. These households are excluded from the category of savings users. The credit category includes all loans taken up from the mentioned institutions. Of the 350 households analyzed, 99 use insurance, 175 use savings products, and 84 use credit. The use of these services need not be exclusive; on the contrary, many of the households use several of these services (Table 1). As we have already pointed out, households’ choices of insurance, loans, and savings products are likely to be strongly interconnected.

Based on the insights from the above literature review, the vector of explanatory variables in our below estimations includes demographic and wealth variables, education and economic activities of the household head, information about remittances, risk exposure, and a locational dummy.¹⁶ In the following, we describe the meaning and computation of the variables¹⁷ and outline our main expectations.¹⁸ Since this study looks at the determinants of financial services uptake based on cross-sectional data, it is important to note that any inference on causal relationships is to be treated with the necessary caution. There are several potential endogeneity issues, which we intend to control for as far as possible; for example, by constructing an asset index for assets owned five years ago (see below). However, we acknowledge that we might not be able to control for all of them and, hence, wish our findings to be seen as a first intent to throw light into an under-researched matter.

¹⁶ As indicated in the literature review, some studies on the use of financial services include supply-side information, such as interest rates, or the history of a client at the respective institution, in their analysis. Others take explicit account of the level of information on the financial market (indicating, to some extent, the level of financial literacy) and the inclusion of microfinance clients in social networks. Although we acknowledge the potential importance of these factors in explaining financial market participation, it is important to note that we did not collect appropriate information on these in our household survey and, hence, cannot include them in the analysis.

¹⁷ In order to avoid potential problems of multicollinearity, we calculated the pairwise correlations between the independent variables as well as the variance inflation factors (using the *collin* command in STATA). We see no reason for concern as none of the variance inflation factors was higher than 1.6.

¹⁸ Table A1 in the Annex summarizes the definition of the variables, and Table A2 provides the respective descriptive statistics.

Household Demographic Variables

We assume that there is a strong relationship regarding certain demographic characteristics of the household and the probability of using one or more of the considered financial services. The size of households may influence the use of insurance, credit, and savings products in different ways depending on the composition of the household. In our data, household size correlates very strongly with the number of dependants (correlation coefficient of 0.93); hence, larger households are here households with more children and elderly people and not households with more economically active adults. Therefore, we assume that household size negatively affects the use of savings products and credit, as larger households are likely to consume a large share of their income and have less collateral. It is not clear what the relationship between household size and participation in insurance will be. On the one hand, it may be positive as a higher number of household members increases the level of responsibility of the household head and therefore offers incentives for better risk protection. On the other hand, it may be negative due to the previously mentioned high consumption share of these households. A positive relationship is presumed with regard to age of the household head. We control for possibly decreasing marginal effects of age by including age squared. In line with other studies, we do not expect a life-cycle effect for savings products, but we do expect one between age and using loans as well as insurance: While rising age will enhance the uptake of credit or insurance of a household head initially—because of growing experience regarding the benefits and risks of credit or insurance, an increasing need for financial input for economic activities, or increasing responsibility for other household members—this trend will reverse when a certain point in life is reached. Specifically, the need for loans is very likely to decrease when the household head retires, and the protective motivation for requiring insurance would be reduced when younger household members leave the household to start their own families. Further, we control for female headship in order to take gender issues into account. The likelihood to take up insurance, savings products, or credit is assumed to be lower in female-headed households as these are often poorer than their male-headed counterparts.

Education Characteristics

In order to capture the education level of the household, we use the number of schooling years of the household head as an indicator for the human-capital endowment of the whole household. In line with the literature, our assumption is that fewer years of schooling will reduce the use of any of the three financial services and especially the probability to purchase insurance as less educated people may be less able to understand the concept behind insurance and the technical procedures attached to it. In addition, low education levels are often correlated to less productive jobs and lower incomes, which, in turn, can be expected

to reduce both access to credit (because of lacking collateral) and the likelihood of having extra money to save or spend for insurance.

Wealth

Using factor analysis, we have constructed an asset index which captures the ownership of physical assets five years ago.¹⁹ The assets considered include consumer durables (bicycle, refrigerator, electric iron, mobile phone, radio, TV, stove), property (another house), and dwelling characteristics (use of electricity as main lighting source, building materials of higher quality, and toilet facilities of higher quality). In line with the literature, we expect a higher asset endowment in a household to have a positive effect on the choice of taking up one or more of the financial services. We use the size of a household's land holdings as a further proxy for the level of wealth. In line with previous studies, we assume that households with more land holdings are more likely to take up an insurance contract, a savings account, or a loan.²⁰

Employment Status

We have created three dummy variables indicating the employment status of the household head. The first dummy takes the value of 1 if the household head is employed in a (private or public) enterprise or organization or if she/he is an employer her/himself, and 0 otherwise.²¹ The second dummy takes the value of 1 if the household head is self-employed and works autonomously (either in small-scale farming or in the nonfarming sector), and 0 otherwise. And the third dummy takes the value of 1 if the household head is not employed for reasons such as young or old age, disability, etc., and 0 otherwise. We assume that households with a head who is either self-employed or not employed are less likely to use financial services than households with an employed/employer head.

Remittances

As noted above, the role of remittances in the demand for financial services has so far been analyzed only in the context of households' savings behavior. In such analyses, savings have been positively correlated with remittances. We expect that the receipt of remittances also affects the choice of taking up other financial service alternatives. The direction of the relation-

¹⁹ By relying on past asset endowments, we avoid potential problems of endogeneity, as the use of financial services may have helped in obtaining certain assets. To our knowledge, this approach has not been applied in the related literature.

²⁰ Endogeneity does not play a large role here as land in the survey area is generally not as easily purchased as other assets but rather acquired via matrilineal inheritance rules.

²¹ This will be the omitted category in the estimation and, hence, the other two categories have to be interpreted in relation to it.

ship is, however, not straightforward. On the one hand, remittances may well be substitutes for loans and insurance, and the relationship would thus be negative. On the other hand, it may be that remittances represent an additional income source and collateral, enabling households to access products they could otherwise not obtain. In our model we use a dummy variable which takes on the value of 1 if a household receives any remittances from former household members who have migrated, and 0 otherwise.²²

Risk Exposure

In line with the literature, we expect that households which are more exposed to risks are more likely to contract insurance.²³ Beyond this relationship, we also assume that risk exposure has an effect on the use of savings products as well as loans, as both these financial services can serve as risk management strategies. Uninsured households may ask for loans or deplete savings after they experienced a shock in order to make up for income losses. Hence, we expect the likelihood of taking up a loan to increase and of using savings products to decrease when the household is more exposed to risks than others. We therefore include three dummy variables on risk exposure in our analysis. The first variable takes the value of 1 if a household experienced the death of a household member during the previous five years and this had severe consequences, and 0 otherwise. Severity is measured in the sense that the household needed more than one month to recover economically from the shock. The second variable takes the value of 1 if a household experienced severe illness during the last five years, and 0 otherwise. And the third variable takes the value of 1 if a household experienced any other severe shock during the last five years, and 0 otherwise. This category captures mostly idiosyncratic shocks besides death and illness. In addition, we include a variable that captures households' subjective assessment of risk. This variable is constructed by factor analysis and covers households' self-assessment of their exposure to a range of risks, such as work accidents, health and economic shocks, relative to other households in their community, and their willingness to take risks. While this risk assessment indicator is expected to have a positive influence on the choice of insurance and savings options, a negative effect is expected for the choice of credit as taking up a loan may be perceived as an additional risk.²⁴

²² We would have preferred to use the absolute value of remittances here but we do not consider the respective data to be reliable enough.

²³ This would reflect the common hypothesis of adverse selection discussed in the debate on insurance demand in developed countries.

²⁴ We cannot take risk aversion into account in our analysis, since experimental methods used to measure personal risk aversion were not included in our survey and related standardized questions in our survey questionnaire did not reflect this attribute in a satisfactory way.

Location

In line with most of the studies on the use of credit and savings deposits, we assume that a household's proximity to an adequate financial institution is crucial to its decision to purchase financial services, as proximity strongly determines transaction costs. We have therefore included a dummy variable in the analysis, taking into account a household's residence in either Benin village or Brakwa village. As noted above, the Brakwa Rural Bank, which is the most heavily utilized financial institution in the villages, has its headquarters in Brakwa but also a branch in Asikuma. Households residing in Benin can thus attend either of the branches, but in both cases must cover the respective distance. We therefore expect households from Brakwa to be more likely to use one or more financial services.

4 Estimation Strategy

Since we assume that households' choices for financial services are interrelated, we apply a multivariate probit model. The alternative choices in the estimation are represented by the three latent variables: use of savings options S^* , use of loans L^* , and use of insurance I^* . Each latent response depends on a vector of explanatory variables X , three unknown parameters $\beta_s, \beta_L, \beta_I$, and the stochastic components of the error terms $\varepsilon_s, \varepsilon_L, \varepsilon_I$. The latter consist of those unobservable factors which explain the marginal probability of making the decision for either of the choices. The set of explanatory variables included in vector X is identical in the three equations, assuming that the same decision-making process underlies each choice.

$$S^* = X' \beta_s + \varepsilon_s \quad (1)$$

$$L^* = X' \beta_L + \varepsilon_L$$

$$I^* = X' \beta_I + \varepsilon_I$$

The three equations from (1) may then be expressed as three binary variables Y_j ($j = S, L, I$) that take the value of 1 if the household uses a financial service, and 0 otherwise.²⁵

$$Y_j = 1(X' \beta_j + \varepsilon_j > 0) \quad j = S, L, I \quad (2)$$

Each ε_j is drawn from a J -variate normal distribution with a mean of zero, and a variance-covariance matrix Σ , where Σ has values of 1 on the leading diagonal and correlations $\rho_{jk} = \rho_{kj}$ as off-diagonal elements. These correlation terms represent the unobserved correlation between the stochastic component of each type of financial service (Cappelari and Jenkins 2003).

²⁵ The three equations in (2) can, of course, be estimated as single probit models. However, this would result in inefficient coefficients, since we assume that households' choices for financial services are interrelated. Single probit estimations do not allow for a non-zero correlation between the error terms. Therefore, we prefer to estimate a multivariate probit model, where non-zero correlation is possible (Jones 2007).

The joint estimation of the three alternative equations (2) is based on a joint trivariate probability involving the evaluation of the loglikelihood over $I = 1, \dots, N$ observations

$$\ln L = \sum_{i=1}^N \ln \Phi_3(\mu_i; \Omega) \quad (3)$$

where $\Phi_3(\cdot)$ is the trivariate normal density function with arguments μ_i and Ω , where

$$\mu_i = (k_{is}\beta_S X'_{iS}, k_{iL}\beta_L X'_{iL}, k_{iI}\beta_I X'_{iI}) \quad (3a)$$

where k_{ij} are the corresponding sign variables that equal 1 if a household uses a given financial service, and minus 1 otherwise. In matrix Ω , the constituent elements are Ω_{jk} , where

$$\begin{aligned} \Omega_{jj} &= 1 \text{ for } j = 1, \dots, 3 & (3b) \\ \Omega_{LS} &= \Omega_{SL} = k_{iS}k_{iL}\rho_{LS} \\ \Omega_{IS} &= \Omega_{SI} = k_{iI}k_{iS}\rho_{IS} \\ \Omega_{IL} &= \Omega_{LI} = k_{iI}k_{iL}\rho_{LI} \end{aligned}$$

This function is estimated using the method of simulated maximum likelihood (SML) by application of the Geweke-Hajivassiliou-Keane (GHK) smooth recursive conditioning estimator in order to evaluate the multivariate normal distribution functions (Greene 2003, Cappellari and Jenkins 2003).²⁶ Under the assumption $\varepsilon \sim N(0, \Sigma)$ clarified above, the three correlation coefficients summarize the association between unobservable household-specific factors that determine the likelihood of choosing one of the different financial services.

The average partial effects (APEs) on the marginal probabilities of the explanatory variables in each equation are estimated by averaging sample partial effects, calculated for each household.²⁷ For the calculation of APEs on the joint probabilities of using combinations of financial services, we apply a routine developed by Kis-Katos (2007). This routine also allows us to estimate standard errors of the APEs through an empirical Bayes procedure. Hereby, 500 replications of the estimated coefficient vectors $(\hat{\beta}_S, \hat{\beta}_L, \hat{\beta}_I, \hat{\rho}_{SL}, \hat{\rho}_{LI}, \hat{\rho}_{SI})$ are redrawn from a multivariate asymptotically normal distribution (characterized by the esti-

²⁶ The GHK smooth recursive estimator exploits the fact that the multivariate normal distribution function with originally three-dimensionally correlated error terms may be expressed as the product of a sequentially conditioned univariate normal distribution function with a linear combination of uncorrelated one-dimensional standard variables, which may be easily and precisely evaluated. To estimate the resulting integral, random draws of these standard normal variables are taken from upper-truncated standard normal distributions. This process is replicated D times and the arithmetic mean of the values of the simulated probabilities from each replication is used to estimate the simulated probability that enters the maximum likelihood function. The advantage of the GHK simulator over other simulation techniques lies in the fact that the estimated coefficients are unbiased, the simulated probabilities lie in the interval (0;1) and they are a continuous and differentiable function of the model parameter (Cappellari and Jenkins 2003).

²⁷ This has been done using the Stata routine *margeff* (Bartus 2005).

mated variance-covariance matrix $\hat{\Sigma}$) and the standard deviation of the partial effects is computed as an approximation of the standard error of the partial effects.

5 Estimation Results and Interpretation

The outcome of the trivariate probit regression, showing the APEs of the explanatory variables on the marginal probability to take up any of the three financial services, is presented in Table 2. The estimated correlation coefficients indicate that the residuals of the financial services functions are highly correlated. Hence, they confirm the strength of the interconnect- edness of the use of insurance, savings products, and loans. The correlation coefficient be- tween the unexplained part of the (simultaneous) use of savings products and loans amounts to 0.88, between savings products and insurance to 0.60, and between loans and in- surance to 0.51. Savings products and loans appear to be the services with the most similar unobservable household-specific determinants. The hypothesis that the correlations between the error terms of each equation are all zero can be rejected at a high significance level; and hence applying the multivariate probit model is appropriate.²⁸

It is important to note that the outcome categories in Table 2 are not mutually exclusive; in other words, households which demonstrate the use of savings products here include those who use only savings and those who additionally use loans, or insurance, or both. The mul- tivariate probit model also allows calculating the APEs on the joint trivariate probability of any given combination of these financial services (see Annex, Table A4). However, most of the respective results simply underline the findings of the trivariate equations so that we re- fer to combinations only where it sheds additional light on the interpretation of underlying mechanisms at work.²⁹ The most interesting aspect of Table A4 is that the alternative of us- ing no financial service at all is explicitly considered here.

In contrast to our expectations, increased household size makes it significantly more likely that a household uses savings products or loans, while household size is not significantly correlated with the uptake of insurance. This is essentially confirmed when looking at the combined use of insurance and other services (see Annex, Table A4) and is not straightforward to explain. One possible, though admittedly vague, explanation could be that larger households are more ex-

²⁸ Note that it would only be appropriate in the case of independent error terms to deal with the above model as independent equations. Nevertheless, we have also estimated the three choice functions as binary probit models (see Annex, Table A3). We find only slight changes with regard to the signs of the estimation coeffi- cients. Generally, marginal effects as well as significance levels are lower than in the case of the multivariate probit results.

²⁹ Due to a very low number of households using only credit, only insurance, or credit and insurance (see Table 3), we do not report the results for these combinations of financial services as we expect them to be rather im- precise. However, they may be obtained from the authors on request. Hence, we here report the APEs of our explanatory variables on the probability that a household uses no financial service, only savings, savings and credit, savings and insurance, and all three services (see Annex, Table A4).

posed to shocks, such as illness, simply because of the higher number of household members. Hence, they may save more in order to build buffers against future calamities, but they may also take up more loans in the event that they are confronted with a calamity.³⁰ Female-headed households are significantly less likely to use savings products and loans, indicating that female heads are generally less able to participate in financial markets, which is most probably linked to the fact that these households are less wealthy and have less income at their disposal than their male-headed counterparts. Interestingly, however, this result does not hold in the case of insurance uptake: There is no significant difference in participation behavior of female and male-headed households.

Table 2: Multivariate Probit Results on the Use of Financial Services

Variable	Savings			Loans			Insurance		
	Coefficient	APEs	t-statistic	Coefficient	APEs	t-statistic	Coefficient	APEs	t-statistic
Household size	0.053	0.020	4.24***	0.056	0.013	3.33***	-0.039	-0.004	-0.96
Female head	-0.527	-0.208	-8.42***	-0.303	-0.084	-2.76***	0.048	0.006	0.74
Age	0.020	0.008	1.04	0.060	0.014	4.23***	0.137	0.014	3.41***
Age squared	-0.0001	-0.00004	-0.67	-0.0005	-0.0001	-2.49***	-0.001	-0.0002	-3.16***
Schooling	0.079	0.031	4.64***	0.048	0.012	1.68*	0.074	0.009	3.23***
Assets	0.366	0.144	4.55***	0.308	0.080	5.13***	0.289	0.037	1.85*
Land	0.001	0.0004	0.16	0.012	0.003	13.01***	0.011	0.001	1.44
Self-employed	-1.190	-0.448	-5.96***	-0.653	-0.170	-3.27***	-0.589	-0.076	-3.68***
Not employed	-1.129	-0.326	-5.53***	-1.516	-0.152	-6.30***	-0.195	-0.017	-1.89*
Remittances	0.441	0.172	3.45***	0.122	0.028	0.90	-0.313	-0.028	-2.01**
Risk assessment	-0.075	-0.030	-1.77*	-0.050	-0.014	-0.79	-0.110	-0.019	-0.73
Death	0.270	0.104	2.53**	0.090	0.020	0.99	-0.069	-0.011	-0.39
Illness	0.325	0.126	1.21	0.512	0.122	12.74***	0.368	0.040	1.75*
Other shock	0.201	0.078	4.41***	0.739	0.207	8.14***	-0.132	-0.012	-0.50
Brakwa	-0.220	-0.085	-2.50**	0.146	0.031	1.07	-0.734	-0.099	-3.55***
Est. correlation coeff.	Q ₂₁ = 0.886		36.12***	Q ₃₁ = 0.563		4.12***	Q ₃₂ = 0.492		3.99***

Note: Results of the trivariate probit model are estimated by SML with 20 pseudorandom draws. t-statistics refer to the estimated coefficients and are based on robust standard errors. Average partial effects (APEs) are calculated with respect to the marginal probability of each type of financial service. The model also includes a constant. Sample size is N = 350 observations. Households in the sample are weighted according to their sampling probabilities. The asterisks indicate level of significance: *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Source: Authors' calculation.

With regard to age of the household head, our results show that age is significantly related to loan and insurance uptake, and that there appears to be a life-cycle effect for these two services. As outlined above, this could imply that with increasing age, household heads re-

³⁰ Since household size is strongly correlated with the number of dependants, that is, economically inactive household members, we can exclude the possibility that experience with financial products will rise with the number of household members.

quest more credit and more insurance since their experience with financial matters increases, their economic activities are more developed, and their family responsibility is higher. Yet, this effect holds only up to a certain age and then turns around. Precisely, the turning point for credit uptake is 61 years of age, and that for insurance uptake is 47. This supports our assumption that the need for credit decreases with pension age³¹ and the need for insurance with adult children leaving the household. In contrast, there is no significant correlation between age of the household head and the use of savings options. As outlined above, this is in line with the literature which shows that there are other dominant factors at work in determining the savings behavior of households in developing countries.

Education was expected to be a significant factor in explaining households' use of any of the three financial services. Our estimation results strongly confirm this assumption, and this is also supported when looking at the combination results, where households with better-educated heads are significantly less likely to use no financial service at all (see Annex, Table A4).³² Similarly, a higher asset index is positively and significantly related to the use of any of the services, which is presumably due to the role of assets as collateral for loans on the one hand and to assets being an indication of the socioeconomic status, and hence of financial literacy and availability of liquid resources for savings and insurance, on the other hand. This latter interpretation is in line with the literature, which shows that microfinance typically does not reach the poorest households (Hulme and Mosley 1997, Navajas et al. 2002, Datta 2004). An interesting finding emerges with regard to land size, which is positively and significantly correlated with the use of loans but is not significantly linked to the uptake of savings options and insurance. This could imply that households with more land holdings demonstrate higher demand for loans geared towards production purposes since their agricultural businesses are larger. However, it could also be a sign of restricted access to financial services for some households in rural Ghana, as land ownership might serve as collateral for loans.

Not surprisingly, households with a head who is either self-employed or not employed are significantly less likely to use savings products, loans, and insurance and are in turn more likely to use no service at all (see Annex, Table A4). This is an indication that households engaged in self-employment and households without an economically active head are constrained in their access to financial services, possibly due to relatively irregular and low incomes. In the opposite (and in line with the respective omitted employment dummy variable), employment in the formal sector, either as an employer or an employee, is as well connected to a higher likelihood to participate in the financial sector. It may, of course, be that there is an

³¹ To be precise, pension age does not refer to any official age (when people start to receive pensions from the social security system) but rather to the point in life when their level of economic activity starts to decrease due to the consequences of aging. The majority of the population in the survey area does not receive public pension payments as they work outside the formal sector.

³² As a robustness check, we also substituted the number of schooling years of the household head for the number of schooling years of the most educated household member. This does not change the results qualitatively.

unobserved factor, such as the capability of the household head, which drives both the employment status and service uptake. If this were true, the effect shown here would be upwards biased.

In terms of the relationship between remittances and the use of financial services, our results suggest that remittances work indeed as a substitute for insurance, shown by a negative significant coefficient in the insurance equation, but they are also a source for savings, demonstrated by a positive significant coefficient for the savings alternative. Looking at the joint probabilities, this result is further confirmed by the fact that there is a strong positive effect of remittances on the choice to use savings products only or to use savings in combination with borrowing, while this is reversed as soon as insurance is used in addition to savings options (see Annex, Table A4). Hence, households obviously regard insurance to be less necessary, if they are potentially able to access remittances in cases of future shocks and emergencies.

We expected that a household's risk assessment and experience of shocks would have an impact on its decision to use financial services, and that the specific impact may differ across the types of products examined. We find that households which feel more exposed to risk than others are significantly less likely to use savings products, and that there is also a negative but insignificant effect of the risk assessment dummy on credit and insurance uptake. Accordingly, households which assume that they are more vulnerable to risk opt not to use any financial service at all and are especially unlikely to use insurance on top of other services, as shown by a significant negative coefficient for the combined use of savings options and insurance and all three services (see Annex, Table A4). This result is quite in contrast to our expectations, particularly regarding the participation in insurance. On the one hand, it might be that risk-sensitive households regard the use of financial services as an additional risk, possibly because they do not trust the providers or do not understand the functioning of the services, and hence prefer to use informal services. A similar conclusion was drawn in earlier studies on insurance (Gine and Yang 2007, Gine et al. 2008, Bhat and Jain 2006). On the other hand, however, it might be that the relationship between risk assessment and participation in the financial market is simply the other way around: Those households who have less access to financial services might be – and feel – more exposed to risk.

Households which have experienced a serious shock in the previous five years are significantly more likely to use savings products, loans, or insurance. However, which financial service they use seems to be related to the type of shock. Households that have experienced the death of a household member during the previous five years are significantly more likely than others to save, a finding which is quite opposite to our expectations. One tentative interpretation may be that, provided there is sufficient time between the event of death and the current savings status, households are sensitized towards the possible hazard of death and therefore save today for the future. A similar interpretation may of course hold for the experience of illness and other shocks as well, but our findings show that households be-

have differently in these cases. As far as illness is concerned, the results suggest that households are more likely to use insurance and loans, with the latter exhibiting a much higher marginal effect. This is underlined when looking at the combined use of services, where all those choice categories including the use of credit show a strong positive significant effect with regard to the experience of severe illness in the household, whereas all other combinations don't (see Annex, Table A4). This finding is confirmed for the case of having experienced any other severe shock. While the experience of other severe shocks exhibits a significant positive coefficient in the savings as well as the credit participation function, looking at the probabilities of combined usage of services shows that the positive effect of the experience of other shocks than illness or death holds only for those choice categories, in which loans are involved, while the effect is even reversed for those households using savings products only or savings products and insurance in combination (see Annex, Table A4). These results are in line with the assumption that credit often serves as a coping mechanism *ex post* to a shock. Contrary to a priori expectations, but corresponding to the outcomes of the subjective risk assessment variable, the use of insurance, either on its own or in combination with savings options, does not seem to be influenced very much by the experience of shocks.

Quite surprisingly, residence in Brakwa, as an indicator of relative proximity to the main financial institution in the survey area, is negatively and significantly correlated with the use of insurance and savings products. More precisely, the location of a household in Brakwa raises the probability that it uses none of the services and is therefore presumably more engaged in informal financial mechanisms (see Annex, Table A4). At the same time, it also reduces the probability that insurance is used on top of the other financial services although households are closer to the financial institution compared with their counterparts in the other community, Benin. One possible explanation for this is that the personal insurance adviser, who is GLICO's main local agent in the Brakwa Rural Bank and who is responsible for the sale and distribution of the Anidaso policy in this area, lives in and is part of the social community of Benin. We assume that trust in the insurance product and the local distributing institution is enhanced through this personal contact, resulting in a higher likelihood that households in Benin village use insurance, although they are farer away from the place where the rural bank offering the policy is located.

6 Conclusion

With this paper, we intend to add value to the discussion about households' participation in financial markets in rural areas of developing countries. We study the determinants of use of all three components of the so-called finance trinity – insurance, savings products, and credit. We do so as we assume that 1) households' choices for financial services are interrelated and 2) the determinants of use are similar for the three services. We simultaneously investigate the

similarities and differences in the determinants of uptake of these services, taking into account that households may use more than one service at a time. Based on household survey data, which we collected in two villages in the Central Region of Ghana, we analyse the relevance of demographic characteristics, asset endowments, economic activities of the household head, receipt of remittances, risk assessment, shock experience, and the location of residence for households' choices of insurance, savings products, and loans. Our results confirm several standard findings of earlier contributions on credit demand, savings behavior, and insurance purchase. We find that education level, asset endowment, and regular (formal) employment status enhance financial service uptake. This supports the widespread assumption that poorer households are more likely to be excluded from the financial sector than better-off households. An equally common result in the literature is that female headship decreases the likelihood that households will be engaged in the financial market. Our data substantiate this relationship for savings and loans but interestingly show that female-headed households are no more or less likely to contract insurance than their male-headed counterparts.

Beyond repeating these standard findings, our approach also allows for additional interesting insights into the functioning of the rural financial market in Ghana. We include several potential determinants of use that have not been tested in the same way for all three services under consideration. The resulting evidence reveals that the usage of financial services depends not only on the socioeconomic status of households but also on various other factors. First, in line with much of the literature, we find that there is no life-cycle effect for savings. Instead, we show that there is such an effect for loans and insurance, which has so far not been acknowledged in earlier studies. Second, it turns out that households which receive remittances exhibit a different behavior than comparable households which do not receive them. On the one hand, remittances increase the available financial resources for savings, and on the other hand, they appear to be substitutes for insurance. This indicates that informal means of managing risk compete with formal mechanisms, at least to a certain extent. Third, we illustrate that households which feel more exposed to risk than others are less likely to use financial services, particularly insurance. This is in stark contrast to our assumptions and might imply that these households are generally more cautious regarding the financial sector and may be inadequately informed about risks and how insurance could mitigate them. Instead, they seem to perceive insurance as an additional risk. Fourth, we find that households which experience severe shocks often borrow, apparently to smooth consumption in the aftermath of the calamity. Fifth, households with more land holdings take up significantly more credit as well, which may reflect the use of credit for investment reasons. Finally, we demonstrate that even though the geographical proximity to the financial institution seems to play a role in the use of financial services, social proximity to the institution's staff may be even more important.

These findings need to be treated with the necessary caution as our data may be subject to several endogeneity problems. In particular, wherever we have intended to draw conclusions

on causalities we acknowledge that the relationship might actually be reversed. Therefore, we hope that our analysis will serve as an attempt to throw additional light into the matter of households' participation in financial markets and that it will trigger further research.

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Annex

Table A1: Definition of Explanatory Variables

Variable	Description
Household size	Household size
Female head	Dummy variable, 1 if household is headed by a female, 0 otherwise
Age	Age of the household head
Age squared	Age of the household head squared
Schooling	Number of schooling years of the household head
Assets	Assets (bicycle, another house, refrigerator, electric iron, mobile phone, radio, TV, stove, use of electricity as main lighting source, building materials of higher quality, and toilet facilities of higher quality) owned by the household five years ago, index created by factor analysis
Land	Size (in acres) of land used by the household
Self-employed	Dummy variable, 1 if household head is self-employed in either agriculture or nonagricultural 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
Remittances	Dummy variable, 1 if household receives any remittances from former household members who have migrated, 0 otherwise
Risk assessment	Household's assessment of own risk situation (subjective exposure to health shocks, road or work accidents, and economic shocks compared with neighbors; own rating of willingness to take risks), index created by factor analysis
Death	Dummy variable, 1 if household experienced the death of a household member in the previous 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 previous 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 shock other than death or illness of a household member in the previous five years and this shock had serious consequences; i.e., household needed more than one month to recover, 0 otherwise
Brakwa	Dummy variable, 1 if household resides in Brakwa, 0 otherwise

Source: Authors' illustration.

Table A2: Descriptive Statistics

Variable	Mean	Stand. error
Household size	4.37	0.148
Female head	0.42	0.030
Age	47.01	0.941
Age squared	2,479.54	95.736
Schooling	6.50	0.317
Assets	-0.18	0.050
Land	3.55	0.374
Self-employed	0.80	0.023
Not employed	0.06	0.013
Remittances	0.28	0.027
Risk assessment	0.10	0.058
Death	0.42	0.030
Illness	0.36	0.029
Other shock	0.15	0.021
Brakwa	0.80	0.023

Source: Authors' illustration.

Table A3: Binary Probit Results on the Usage of Financial Services

Variable	Savings			Loans			Insurance		
	Coefficient	APEs	z-statistic	Coefficient	APEs	z-statistic	Coefficient	APEs	z-statistic
Household size	0.046	0.012	1.22	0.036	0.007	0.97	-0.051	-0.006	-1.40
Female head	-0.536	-0.143	-2.90***	-0.327	-0.064	-1.88*	0.070	0.008	0.39
Age	0.006	0.001	0.18	0.065	0.013	1.83*	0.132	0.014	2.74***
Age squared	-1.66e-06	-4.28e-07	-0.01	-0.0006	-0.0001	-1.65*	-0.001	-0.0002	-2.90***
Schooling	0.112	0.029	4.61***	0.063	0.013	2.18**	0.098	0.011	3.24***
Assets	0.368	0.095	3.49***	0.266	0.053	2.61***	0.269	0.029	2.53***
Land	-0.002	-0.0004	-0.18	0.009	0.002	0.81	0.010	0.001	1.18
Self-employed	-1.199	-0.345	-4.15***	-0.485	-0.109	-2.27**	-0.572	-0.074	-3.41***
Not employed	-1.208	-0.249	-3.76***	-1.184	-0.145	-4.61***	0.133	0.015	0.26
Remittances	0.495	0.131	2.23**	0.191	0.039	0.80	-0.261	-0.026	-1.55
Risk assessment	-0.079	-0.020	-0.84	-0.048	-0.009	-0.55	-0.116	-0.013	-1.31
Death	0.233	0.060	1.10	0.111	0.022	0.49	-0.129	-0.014	-0.76
Illness	0.251	0.065	1.20	0.427	0.088	1.65*	0.293	0.033	1.29
Other shock	0.182	0.047	0.61	0.765	0.184	2.19**	-0.114	-0.012	-0.48
Brakwa	-0.215	-0.056	-0.96	0.134	0.026	0.57	-0.816	-0.114	-6.45***

Note: Average partial effects (APEs) are calculated with respect to the marginal probability of each type of financial service. The model also includes a constant. Sample size is N = 350 observations. Households in the sample are weighted according to their sampling probabilities. The asterisks indicate level of significance: *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Source: Authors' calculation.

Table A4: Average Partial Effects on Joint Probabilities of Using No, One, or More than One Financial Service

Independent variables	No use		Savings only		Savings and credit		Savings and insurance		All three	
	APEs	t-statistic	APEs	t-statistic	APEs	t-statistic	APEs	t-statistic	APEs	t-statistic
Household size	-0.011	-4.18***	0.006	2.01**	0.010	2.10**	-0.002	-1.08	0.0008	0.25
Female head	0.116	4.82***	-0.073	-6.63***	-0.053	-2.57**	-0.002	-0.27	-0.016	-1.99**
Age	-0.014	-2.47**	-0.008	-1.19	-0.002	-0.44	0.004	1.78*	0.011	1.88**
Age squared	0.0001	1.86*	0.0001	1.37	0.00003	1.00	-0.00004	-1.77*	-0.0001	-1.74*
Schooling	-0.019	-3.88***	0.007	4.86***	0.004	1.63	0.003	4.07***	0.007	1.92*
Assets	-0.098	-3.97***	0.026	1.79*	0.028	2.15**	0.010	1.17	0.032	1.78*
Land	-0.001	-0.93	-0.001	-1.02	0.0007	2.91***	-0.00007	-0.15	0.001	3.67***
Self-employed	0.298	5.05***	-0.148	-2.03**	-0.085	-2.79***	-0.024	-2.21**	-0.084	-2.67***
Not employed	0.250	7.58***	-0.085	-2.49**	-0.106	-3.22***	0.006	0.77	-0.066	-1.94*
Remittances	-0.081	-1.83*	0.086	10.24***	0.049	5.46***	-0.008	-1.72*	-0.009	-0.43
Risk assessment	0.022	1.97**	-0.005	-1.34	-0.0004	-0.05	-0.005	-2.00**	-0.010	-3.35***
Death	-0.052	-3.10***	0.041	2.15**	0.027	1.24	0.002	0.21	0.0001	0.02
Illness	-0.098	-1.90*	-0.003	-0.07	0.044	3.39***	0.002	0.13	0.044	2.92***
Other shock	-0.086	-7.79***	-0.040	-3.10***	0.095	2.54**	-0.020	-2.03**	0.018	0.69
Brakwa	0.066	2.20**	-0.015	-0.88	0.042	2.25**	-0.049	-1.97**	-0.036	-3.68***

Note: Estimation results are based on the trivariate probit model. The average partial effects (APEs) are calculated with respect to the joint trivariate probability of each outcome. No use of financial services refers to the outcome $P(S=0, L=0, I=0)$, savings only to $P(S=1, L=0, I=0)$, savings and credit to the outcome $P(S=1, L=1, I=0)$, savings and insurance to $P(S=1, L=0, I=1)$, and all three financial services to $P(S=1, L=1, I=1)$. t-statistics are based on standard errors estimated approximately by parametric bootstrap. Sample size is $N=350$ observations. Households in the sample are weighted according to their sampling probabilities. The asterisks indicate level of significance: *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Source: Authors' calculation.