Essay 1

1. Participation in Micro Life Insurance and the Use of other Financial Services

Abstract:
This paper investigates households’ decisions to take up micro life insurance and to use other financial services in Ghana. It estimates a multivariate probit model based on household survey data. The results provide evidence for a mutually reinforcing relationship between the use of micro life insurance and the use of other formal financial services. Risk averse households and households who consider themselves more exposed to risk than others are found to be less likely to participate in insurance. This suggests that insurance is considered to be risky. There is also indicative evidence for adverse selection and a life cycle effect in the uptake of micro life insurance.

1.1 Introduction
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 Morduch 2005: 147). Microcredit long dominated the microfinance market, but 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) – and microinsurance has entered the market in many developing countries. However, since it is a relatively young phenomenon, the spread of microinsurance is still limited. A recent study shows that only about 2.6 percent of the African population living under US$2 per day are currently covered (Matul et al. 2010). Nevertheless, microinsurance is generally seen and promoted as an important financial service for low-income people in developing countries, offering (at least partial) protection in the event of serious shocks, such as death, illness, or natural catastrophes, given the absence of accessible and functioning conventional insurance markets and public social security systems.2

2 See, for instance, the detailed contributions in Churchill (2006) on the challenges and potentials of microinsurance.
While microcredit and, to a lesser extent, microsavings, have been studied quite extensively, microinsurance has so far received only limited attention in the academic literature. In particular, not much is known about why uptake of microinsurance is still low, even though this is one of the most crucial questions to answer if greater coverage is to be achieved. A number of recent studies have focused on the determinants of households' participation in the microinsurance market pointing to the importance of basis risk, household wealth, credit constraints, risk aversion, trust, endorsement from social networks, hyperbolic preferences, and particular marketing methods (Wang and Rosenman 2007, Giné et al. 2008, Cai et al. 2009, Cole et al. 2009, Giné and Yang 2009, Thornton et al. 2009, Ito and Kono 2010).

We argue that households' participation in microinsurance may additionally be related to the use of other financial services, i.e. loans and savings products, and that this may also help to explain low insurance uptake. In fact, we can think of different ways in which insurance, loans and savings may be interrelated. On one hand, it could be that the three services are substitutes for each other. Microinsurance does not enter a vacuum but joins a range of alternative mechanisms, including financial services, which households use in order to share risks and to deal with shocks. To the extent that these mechanisms are, or at least appear to be, efficient strategies, households may tend to continue applying them, which may in turn explain low uptake of microinsurance.

As the literature has shown, household savings often serve an insurance purpose. Such a precautionary motive for savings is in contrast to an accumulation motive, and it is higher when income is uncertain and credit constraints are taken into account (Skinner 1988, Deaton 1989, Eswaran and Kotwal 1989, Zeldes 1989, Besley 1995, Browning and Lusardi 1996, Giles and Yoo 2007, Lee and Sawada 2007, 2010). Credit also often takes on insurance functions if it is used for consumption instead of investment (Eswaran and Kotwal 1989, Zeller 2001). There is a vast literature on risk sharing, including the exchange of loans between members of an extended family or a community in emergency cases, which many authors refer to as informal insurance (Alderman and Paxson 1994, Morduch 1995, 1999, Townsend 1995, Platteeu 1997, Dercon 2002). However, credit as insurance is not a feature of the informal financial market alone; it is well applicable to loans on the formal financial market. It is plausible that savings and loans are particularly strongly used as substitutes for insurance when no insurance market exists, as in many developing countries,
but we believe there is no reason to expect the motivation for precautionary savings and emergency loans to vanish with the expansion of formal insurance\(^3\).

On the other hand, it could be that the uses of insurance, loans and savings reinforce each other, at least if we think of insurance as being distributed via financial institutions that also provide the respective other services. There are no good theoretically reasons why different financial services should reinforce each other, but in practice this might happen. First, users of one service may simply have an informational advantage over non-users 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. Second, users may have a higher level of financial literacy than non-users, that is, a better understanding of how financial services function, and may therefore better recognize the advantages of using another service as well. Third, savings as well as insurance may serve as a kind of collateral for loans, especially among poorer households for which other (asset-based) forms of collateral are unavailable\(^4\). Fourth, life insurance might be mandatory for getting credit from any of the credit providers, if so, the interrelation between the financial services is by product design, for instance by credit life insurances\(^5\). Fifth, life insurance only covers the occurrence of death in the household, while savings and credit covers more adverse circumstances beyond it, so that households might use more than one financial service to cover the consequences of all possible future hazards. In all cases, households using at least one service can be assumed to be more likely to start using an additional service than households using no service at all. The fact that a non-negligible share of households in developing countries does not have access to the formal financial market may in fact explain low uptake of microinsurance.

It is the objective of this paper to contribute to the discussion on the demand-side determinants of households’ participation in microinsurance. Our approach differs from previous studies in three ways. First, we explicitly take into account that households tend to use more than one financial service and that there may be interconnections between these. It is not a trivial task to consider the uptake of microinsurance and the use of other financial services in an empirical estimation. There is vast scope for endogeneity, as unobserved het-
erogeneity may actually influence households’ decisions of uptake of all of the services. Additionally, there may be problems of reverse causality as households without insurance may tend to save more, or take up more loans, in order to deal with future, or past, shocks. Therefore, and in order to capture potential joint underlying decision-making processes, we address the choices of micro-insurance, formal savings, informal savings, formal loans, and informal loans simultaneously in a reduced-form multivariate probit model. Such a framework takes into account that the relative probability of uptake of a financial service is influenced by the existence of other alternatives. Another difference to previous studies is that we investigate the uptake of life insurance, whereas earlier studies have concentrated on agriculture, weather index, or health insurance. And third, we present evidence on the uptake of microinsurance in a sub-Saharan African country, which, to our knowledge, is the first study of this kind.

The empirical analysis in this paper is based on cross-sectional data from a survey of 350 Ghanaian households, some of which have purchased a micro life insurance (packaged with a hospitalization benefit, accident coverage and an optional savings scheme). The survey was conducted by the authors in two neighboring small towns (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.

We find some evidence that there is a mutually reinforcing relationship between the use of micro life insurance and the use of other formal financial services, but no evidence for a substitution or crowding out effect between the use of informal financial services and micro life insurance in Ghana. There is empirical evidence that the use of microinsurance depends not only on the socioeconomic status of households, but also on various other factors, such as households’ risk assessment, past exposure to shocks and adverse selection.

The paper is structured as follows. Following this introduction, Section 1.2 presents the particular microinsurance relevant to this paper. Section 1.3 provides a theoretical framework for households’ decisions to take up microinsurance. Section 1.4 describes the source of data, including sample selection and external validity. Section 1.5 introduces the outcome and explanatory variables. The estimation strategy is presented in Section 1.6, and the estimation results are shown and interpreted in Section 1.7. Section 0 serves as a conclusion.
1.2 Design and Distribution of the Anidaso Microinsurance Policy

The microinsurance under study here is called Anidaso policy (“anidaso” meaning “hope” in Twi) and is provided by the commercial Gemini Life Insurance Company (GLICO). The Anidaso policy was developed with initial support of CARE International, but GLICO does not receive subsidies of any kind for this insurance today. The policy offers term life insurance up to age 60, accident benefits, and hospitalization benefits (calculated per day spent in 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 amount at the maturity of the term, can be added on a voluntary basis. We found during our research that most policy holders are actually unaware of the accident and hospitalization benefits and consider Anidaso to be a pure life insurance or, to a lesser extent, a savings device (for retirement)\(^6\). The policy is specifically targeted at low-income people in both urban and rural areas.

For the sale and distribution of the policy, GLICO started to cooperate in early 2004 with six rural and community banks (RCBs)\(^7\). It currently collaborates with 20 RCBs, five MFIs and one savings and loan company in six regions of southern Ghana. The number of Anidaso policy holders per financial institution ranges from around 200 to over 1,000, and the total number of policy holders had reached 15,000 by December 2008. In each of the partnering financial institutions, GLICO assigns one Personal Insurance Advisor (PIA), who is in charge of marketing the Anidaso policy and mediating all running operations between the bank and the insurance company. In addition, there is usually a team of a minimum of two sales agents that joins forces with the PIA in the marketing process. The PIA and the sales agents are typically recruited locally, but they are trained at GLICO’s headquarters.

GLICO’s marketing strategy includes approaching group and opinion leaders in the communities, who are then mobilized to spread the word about the product and to help organize marketing meetings. Furthermore, PIAs and sales

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\(^6\) The fact that GLICO has hitherto only received claims upon death of policy holders but no claims in relation with any of the additional policy components underlines our impression that policy holders consider the Anidaso policy to be a pure life insurance.

\(^7\) In general, RCBs are unit banks owned by members of the community. While they do not exclusively target low-income people, their business is by and large microfinance orientated because the majority of the population in their service areas can be classified as low-income (Basu et al. 2004, Steel and Andah 2008).
agents attend group meetings of microfinance groups or other (financial) self-help groups, accompany rural banks’ mobile bankers\(^8\), make individual door-to-door marketing rounds and approach visitors at the bank. Less frequently, GLICO holds large and widely announced product launches at community centers and bank offices. Interested individuals can usually apply on the spot.

There are no clearly defined eligibility criteria for policy holders except that they have to be adults below the age of 55 and that they have, or are willing to open up, an account with the local financial institution. This latter condition is necessary because the insurance premiums are directly deducted from policy holders’ accounts; or from group accounts (if policy holders are organized in groups)\(^9\). No detailed health check or information on the health condition of applicants or other household members is required\(^10\). The monthly premiums start at 2 Ghana Cedi and may be as high as 10–15 Ghana Cedi if the savings component is chosen\(^11\).

1.3 Theoretical Framework for Insurance Participation

In their pioneering study on participation in an index-based, agricultural micro-insurance, Giné, Townsend and Vickery (2008) present a simple neoclassical benchmark model of households’ decisions to take up insurance, which they complement with important insights from behavioral economics. This model has guided the analysis in Cole et al. (2009) and also forms the basis of our theoretical framework. We modify their predictions and add some expectations to match our insurance example and to include insights from standard asymmetric information models on insurance consumption. As noted above, the Anidaso

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\(^8\) These operate in the same (but formalized) way as so-called “susu” collectors in the informal financial sector, to which we refer below.

\(^9\) Financial groups are very common in Ghana. In the formal financial market, they usually have a joint savings account and accumulate savings from their members in order to qualify for a loan. In the case a loan was granted, the group handles the collection of repayments, acts as a mediator between the loan officers and the individual group members, and bears responsibility for recovery. Yet, direct lending to individuals with a credible history as a member of a group or, in cases where a group approach is not suitable, is also common (Steel and Andah 2008).

\(^10\) In fact, this feature of the policy is used for promotion purposes in the Anidaso policy information flyer.

\(^11\) In our sample of 87 Anidaso policy holders, the mean monthly premium is 3.95 Ghana Cedi and the median is 3.10 Ghana Cedi. The exchange rate at the time of our survey (February 2008) was 1.00 Ghana Cedi = 1.05 US Dollar.
policy is not purely a life insurance, but includes accident and hospitalization benefits. Yet, since we observed that these additional benefits are not as important as the life coverage to policy holders (or are altogether unknown by the policy holders), we treat the Anidaso policy, as if it did not include them at all. In other words, we consider Anidaso a life insurance policy only.

The benchmark model of Giné, Townsend and Vickery (2008) refers to a full information setting and predicts that households’ uptake of insurance is increasing in risk aversion, in the expected insurance payout relative to the cost of insurance (in other words, the subjective probability of risk), and in the size of risk exposure (or, the objective probability of risk); and it is decreasing in basis risk, i.e. the correlation between insurance payout and the risk to be insured. Applying the benchmark model to our case, all of these predictions persist with the exception of basis risk, which is not an issue here, as the Anidaso policy is not an index-based insurance. Yet, it is a life insurance, and hence, a bequest motive which is commonly included in standard models of participation in life insurance markets (Yaari 1965, Hakansson 1969, Fischer 1973, Lewis 1989) may be considered. A bequest motive can be expected to increase noticeably when individuals marry or have offspring. Over the lifetime of the consumer, the subjective weighting function for bequests is assumed to take on a hump shape, as the importance of bequests is greatest when the consumer dies at prime age.

It is important to note that the bequest motive is directly applicable only to life insurance that covers mortality risk, generally referred to as term life insurance. The determinants of uptake of permanent life insurance such as whole life insurance, however, may be somewhat different. Hence, some authors take the motive for saving for retirement into account (Pissarides 1980). In practice, many insurance contracts actually serve both bequest and savings motives simultaneously. Empirical evidence has shown that term life insurance and whole life insurance are not necessarily substitute goods, i.e. both motives may co-exist (Babbel and Ohtsuka 1989, Outreville 1996).

In principle, the Anidaso policy is a term life insurance as it pays a determined amount to the insured’s family if the insured dies within the policy term. However, due to the (voluntary) savings component, it is not a pure form of term life insurance but may be rather considered a universal life insurance (Black and Skipper 2000). Therefore, insurance participation can be generally expected to be higher when there is a strong motive for a bequest to be left to remaining household members. For those people who choose the savings component, savings motives are likely to play a role as well. It would be plausible to assume a change in preferences over time regarding the utility from expected consumption versus the utility from bequest, i.e. the bequest motive diminishes
with increasing age, while the saving-for-retirement motive becomes more important.

Following their benchmark specification, Giné, Townsend and Vickery (2008) augment their simple model with credit constraints so as to account for the fact that the degree of liquidity may play a key role in the decision to participate in insurance. Yet, the relationship between financial constraints and households’ willingness to pay for insurance is ambiguous. On one hand, it could be that liquidity-constrained households are more likely to purchase insurance, because they have less ability to deal with the consequences of shocks than households that are not liquidity-constrained. This option was theoretically laid out by Gollier (2003) who explains that self-insurance in the form of reducing savings or borrowing is a substitute to costly formal insurance. He summarizes that “only liquidity constrained households would purchase a generous insurance coverage” (Gollier 2003: 21). On the other hand, in the specific setting of Giné, Townsend and Vickery (2008), insurance is purchased at the same time as agricultural inputs are bought. Hence, credit-constrained households may prefer to use all available funds for inputs, and the authors consider this option more likely than the first. While the Anidaso policy is not directly linked to production decisions, one may still consider the possibility that limited cash would rather be invested in income-generating activities than in insurance to secure (a minimum) future income. In sum, the expected relationship remains ambiguous and the direction of the association would have to be established empirically.

In the light of standard predictions about consumers’ insurance-purchasing behavior such as the ones cited here, experiences in the real world have often revealed remaining puzzles. As a potential explanation for insurance participation in developing countries that deviates from the conventional model, Giné, Townsend and Vickery (2008) consider households’ trust in the supplier and households’ understanding of an insurance policy. Even though the authors do not formally model such behavioral factors, they introduce hypotheses on their relevance for insurance uptake decisions. Specifically, they predict that trust in the vendor, information gleaned from social networks, and greater cognitive ability make insurance purchase more likely. They show that allowing for these

12 Within behavioral finance, trust has often been considered in models of stock market participation. For example, Guiso et al. (2008) show that the perception of risk in stock markets is not only a function of the objective characteristics of the stock, but also of the consumer’s subjective probability to be cheated. From a slightly different perspective, Hong et al. (2004) propose that social interaction enhances trust in stock markets in the sense that “social” consumers find it more attractive to invest in stocks when more of their peers participate.
factors helps explain deviations from the benchmark model. Other authors have confirmed the enormous relevance of trust and familiarity with the product and the supplier (Cai et al. 2009, Cole et al. 2009, Thornton et al. 2009), and we expect similar results in our case.

As another potential explanation for observed deviations from the standard model, a number of studies have included adverse selection and moral hazard in models of insurance-purchasing behavior (Rothschild and Stiglitz 1976, Chiappori 2000, Dionne et al. 2000, Winter 2000, Abbring et al. 2003). Different to the case of the rainfall insurance studied by Giné, Townsend and Vickery (2008) and Cole et al. (2009), the life insurance market can be considered a “prime example of a market saddled with the inefficiency associated with adverse selection” (Cawley and Philipson 1999: 827)\(^\text{13}\). Thus, we relax the assumption of full information. In line with asymmetric information models (e.g. Rothschild and Stiglitz 1976), we expect that – given equal premiums and benefits of the policy – households with a higher riskiness (i.e. those with a higher exposure to the insurable risk) tend to purchase the Anidaso policy more than households with a lower riskiness. Since it is rather unlikely that insured households behave less carefully and provoke the risk covered under the insurance (i.e. death), moral hazard, however, is not supposed to present an essential problem.

As noted above, we furthermore assume that there is an association, which may be either positive or negative, between the uptake of microinsurance and the use of other financial services. As we have already outlined, the association is not straightforward: Savings and credit may either be substitutes for microinsurance, or their use may reinforce the uptake of microinsurance. In order to better understand and analyse this matter, it may in fact be necessary to distinguish between savings and loans from formal sources and those from informal sources\(^\text{14}\). In our case, the mutually reinforcing effect of savings and credit on one hand and insurance on the other relates to services provided in the formal financial sector, as the Anidaso policy is solely provided by formal financial institutions. Substitution between savings and insurance as well as between credit and insurance is generally possible for services from both formal and informal institutions. Households may have a precautionary motive in mind, no matter

\(^{13}\) In the analysis of indexed-based insurance by Giné, Townsend and Vickery (2008) and Cole et al. (2009), information asymmetry does not play a major role because rainfall patterns that are relevant for index-based payouts are public information and rainfall measurement instruments are protected from manipulation by farmers.

\(^{14}\) In the remainder of Essay 1, we use the terms formal/informal services and services provided on the formal/informal financial market interchangeably.
whether they deposit their savings in banks or collect them with informal savings groups or at home. In general, loans may be used in order to deal with the consequences of shocks regardless of where they come from. Yet, in reality it may be more difficult to obtain a loan for such a purpose from the formal sector than from social networks, such as extended families. In sum, we expect a negative relationship between the use of informal savings as well as informal loans and the uptake of microinsurance, and a positive relationship between the use of formal loans and microinsurance, while the relationship between formal savings and microinsurance remains inconclusive.

1.4 Sources of Data

The data for our empirical analysis comes from a survey of 350 households in the Central Region of Ghana. Previous studies on households’ participation in microinsurance in developing countries have either followed the same approach and used household survey data (Wang and Rosenman 2007, Giné et al. 2008, Ito and Kono 2010) or have conducted randomized experiments (Cai et al. 2009, Cole et al. 2009, Giné and Yang 2009, Thornton et al. 2009). Though the second way of data collection is clearly advantageous in terms of the researchers’ control for selection into participation, we could not run such experiments due to time and resource constraints. Nevertheless, we believe that our results allow for external validity, at least to a certain extent, as we explain in the following description of survey sampling.

In a first step, we chose to investigate the Anidaso policy, as GLICO had been identified as the only known insurance provider in sub-Saharan Africa offering voluntary life insurance to low-income households. In a second step, we selected the specific survey area, Brakwa and Benin, from the service areas of all 26 financial institutions that distribute the policy. In doing so, we only con-
sidered small to medium-sized towns in semi-urban or rural areas\textsuperscript{17}, because we intended to make sure that we would find a high share of low-income people in the overall population, assuming that people in rural areas are on average poorer than people in urban areas\textsuperscript{18}. We also paid attention to a relatively high density of bank clients holding an insurance contract and to the easy accessibility of the area. Out of five possible survey sites, we randomly chose Brakwa and Benin. Hence, our results should be at least representative for these five semi-urban locations in the South of Ghana where microinsurance is available.

While we acknowledge that external validity is not fully given, we nevertheless believe that the scope for generalization goes beyond the local area of the survey itself. We have little reason to assume that GLICO executes non-random program placement and chooses the cooperating institutions on the basis of particular characteristics. From discussions with GLICO staff, we conclude that in principle the insurer would distribute its microinsurance policy through any formal financial institution that is both interested in doing so and has the ability to deduct the premiums from policy holders’ accounts. In the South of Ghana, there are financial institutions (by and large in the form of RCBs or MFIs) in every district capital and also in many other towns that could generally distribute the policy. We acknowledge that there remains some lack of clarity as to why the particular financial institutions were selected to offer Anidaso and not others. Yet, we assume that this selection is simply a matter of the recent emergence of the Anidaso policy and the need to “start somewhere”.

Furthermore, Brakwa and Benin are typical towns of the South of Ghana, and the Asikuma/Odoben/Brakwa district in which they are located is an average mostly rural district with a rural population of 68 percent. The district is a highly agrarian, local economy with over 60 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) (Republic of Ghana 2007). Activities outside farming are focused in small-scale industrial businesses and petty trading. We therefore assume that our findings could be replicated in any location in the South of Ghana and similar contexts in sub-Saharan Africa, except for cities and truly remote areas. However, in order to determine to what extent this as-

\textsuperscript{17} Out of the 26 financial institutions, 11 were located in an urban setting.

\textsuperscript{18} In 2000, the poverty headcount in the Asikuma/Odoben/Brakwa district amounted to 57.6 percent on average with 42.1 percent in urban areas and 64.8 percent in rural areas. Rural poverty is high in this particular district: The poverty headcount in rural areas in the Central Region as a whole is 46.5 percent. These numbers are based on data from the 2000 census (Coulombe 2008). The IMF (2006) also presents poverty estimates for the district. The poverty headcount is 62 percent in total here, 35 percent in urban areas and 74 percent in rural areas.
Assumption is true, further empirical research, including data collection in other locations, is needed.

In Brakwa and Benin, we listed all households and conducted stratified random sampling. We stratified the households according to their insurance membership status. It is important to note that the Anidaso policy is not the only insurance available in the area. Donewell, a commercial insurance company, provides life, accident and car insurance, and there is the public National Health Insurance Scheme (NHIS). The NHIS was launched in 2004 and replaced the cash-and-carry healthcare system. It provides medical care at public hospitals, recognized private hospitals, and health centers for contributors and their dependents. Premiums are graded by income, and particular groups, such as the elderly, indigent people and pregnant women are covered free of charge. The NHIS is well received, particularly in rural areas, where a majority of people had hitherto gone without health services as a result of lacking resources and insurance alternatives.

In our sampling process, the first stratum was formed by households that were not insured at all, the second by households that were insured by the Anidaso policy (and potentially by other insurance as well), and the third by households that were not insured by Anidaso but by other insurance policies. Households within each stratum were chosen through random sampling, except for the microinsured stratum, in which all households were interviewed. The varying sampling probabilities are controlled for by including appropriate weights in the estimations below. A total of 351 households were interviewed, of which 154 were not insured, 87 were Anidaso insured, and 87 were otherwise insured. The survey questionnaire contained detailed sections on demographic and socioeconomic characteristics of the household, 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.

With regard to households’ use of credit and savings, we found that households rely on a range of services, both formal and informal. The most frequented formal financial institution is the Brakwa RCB, which offers oppor-

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19 The membership in NHIS is legally mandatory (unless alternative private health insurance can be demonstrated). However, in practice it is optional for non-formal sector workers. In 2008, the number of card-holders under NHIS reached 45% of the population (Witter and Garshong 2009).
opportunities for savings and loans (and of course the Anidaso policy), on either an individual or a group basis. Another formal institution in the survey area, but much less used, is the Ghana Commercial Bank, which has a branch in Asikuma that offers various types of savings products and loans. The survey data show that at least one MFI 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 financial services provided by them as formal services in our estimations.

In terms of informal financial institutions, we were able to observe money-lenders, credit groups, and the suyu system. Susu institutions include individual savings collectors, rotating savings and credit associations, and savings and credit “clubs” run by an operator. Furthermore, mutual lending between relatives and other social networks is very common. Eligibility criteria are naturally not defined in these informal activities; however, research has demonstrated that a number of social factors, such as social visibility, reputation and social integration, are of considerable relevance, particularly in order to access informal loans (Ayalew 2003, Fafchamps and Lund 2003, Fafchamps and Gubert 2007, Vanderpuye-Orgle and Barrett 2009, Schindler 2010).

1.5 Definition of Variables

In the below estimations, we distinguish between five categories of financial services that households use. These categories indicate whether or not households used insurance, formal savings options, informal savings options, formal credit, or informal credit in the five pre-survey years. The insurance category is confined to the Anidaso policy. The formal savings category includes savings accounts, current accounts (which are often used for the purpose of savings), and other savings products offered by the formal financial institutions active in the two towns, mainly the Brakwa RCB.

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20 In 2003, there were over 4,000 collectors nationwide, collecting the equivalent of an average of US$15 per month from approximately 200,000 clients (Steel and Andah 2008).

21 For robustness checks, we extend the insurance category to also include NHIS insurance and the few other insurance policies available in the area. In our sample, 21 households have some private insurance other than Anidaso and 132 have NHIS. In the total population, the respective shares are 4.68 percent and 26.19 percent.

22 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 for 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...
formal schemes, including within the *susu* system, in self-help groups, and at home. The formal credit category includes all loans taken up from formal institutions. The informal credit category entails loans from informal credit schemes, self-help groups, friends, family members and moneylenders. Of the 350 households analysed, 87 use the Anidaso insurance policy, 168 use formal savings, 175 use informal savings, 84 use formal credit, and 124 use informal credit (Table 1.1)\(^{23}\). The use of these services need not be exclusive; on the contrary, many of the households use several of these services simultaneously.

**Table 1.1: Use of Financial Services**

<table>
<thead>
<tr>
<th>Services used</th>
<th>Number of households in the sample (total = 350)</th>
<th>Estimated number of households in the survey area (total = 2,042)</th>
<th>Estimated proportion in the survey area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anidaso policy</td>
<td>87</td>
<td>92</td>
<td>4.51</td>
</tr>
<tr>
<td>Formal savings</td>
<td>168</td>
<td>707</td>
<td>34.61</td>
</tr>
<tr>
<td>Informal savings</td>
<td>175</td>
<td>1,000</td>
<td>48.97</td>
</tr>
<tr>
<td>Formal credit</td>
<td>84</td>
<td>327</td>
<td>16.02</td>
</tr>
<tr>
<td>Informal credit</td>
<td>124</td>
<td>732</td>
<td>35.87</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation.

*Note:* Households in the sample are weighted according to their sampling probabilities. Based on the weighted amount of the first column the number of households in the survey area is estimated in the second column. This explains the discrepancy between the proportion of households in the sample and the estimated proportion in the survey area.

Since our analysis primarily aims at examining patterns of insurance uptake, the theoretical framework on insurance participation provides the main guidance for the definition of the explanatory variables to be included. We assume that the determinants of the use of loans and savings options are similar to those of the use of insurance\(^{24}\). While this may seem to be an arbitrary assumption at first sight, it actually turns out to be a valid one when looking at the empirical literature on borrowing and savings behavior in developing countries (Deaton

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precondition for receiving a loan or purchasing insurance and had since not made use of their account for savings purposes. These households are excluded from the category of savings users.

\(^{23}\) In our sample, 21 households have some private insurance other than Anidaso and 132 have NHIS. In the total population, the respective shares are 4.68 percent and 26.19 percent.

\(^{24}\) 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, and insurance uptake.
Empirical Analysis of Participation Patterns in Microfinancial Markets

1989, 1992, Muradoglu and Taskin 1996, Spio and Groenewald 1996, Pal 2002, Kiiza and Pederson 2002, Jabbar et al. 2002, Pitt and Khandker 2002, Swain 2002, Barslund and Tarp 2008). Where this literature offers additional guidance for the empirical specification, we incorporate relevant variables. We assume here that potential determinants of participation in savings and borrowing may influence the uptake of insurance as well. Table 1.2 provides descriptive statistics for the explanatory variables and Table A.1 (in Appendix A) summarizes the definition of these.

With regard to risk aversion, we use a rough proxy based on the following question in our questionnaire “*How do you see yourself? Are you rather willing or unwilling to take risks?*”. Respondents were asked to rank themselves from “0” (unwilling to take risks) to “5” (willing to take risks). Being aware that this question is rather a measure of risk attitude than of risk aversion, we still use it as a risk aversion proxy as it has been shown to be a good predictor of actual risk-taking behavior (Dohmen et al. 2006). We formed a dummy variable which takes on the value of 1 if the respondent reported a ranking of “4” or “5” in response to the question, i.e. being rather risk loving, and 0 otherwise.

We measure size of the insured risk, or the objective probability of risk, with the help of information on the household head’s health status. We thereby assume that the head is the main decision-maker in the household who makes decisions on the basis of knowledge about herself. Even though our insurance of interest is not a health but a life insurance, we argue that current health status is related with the probability of death. We formed a dummy variable indicating whether the household head was ill or injured in the past year. We include a second dummy variable which reveals whether the household head received any kind of vaccination.

We consider the subjective probability of risk by an index created through factor analysis. This index is a measure of households’ assessments of their own risk situation. It includes information on subjective exposure to illness, ac-

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25 In order to avoid potential problems of multicollinearity, we calculated the pairwise correlations between the independent variables as well as the VIFs. We see no reason for concern.

26 We prefer using this binary measure, even though some information of the ordinal structure is neglected, as it minimizes problems arising from individual-specific differences in the use of response scales and as well generates simple and easily interpretable results (Dohmen et al. 2006).

27 The index is created by an factor analysis using principal components factor method. See details on variables included and factor loadings in Table A.2 (in Appendix A).
cidents and economic shocks, relative to other households in their community\textsuperscript{28}. An additional measure for the subjective probability of risk is households’ past exposures to shocks, which we control for by including dummy variables on the experience of death, illness and other shocks in the past five years.

In order to consider the relevance of bequest motives, we include age of the household head. Furthermore, we control for the share of dependents in the household and the marriage status of the household head. We included age and age squared because a considerable part of the literature on savings behavior focuses on the savings pattern over a lifetime and hence regards age and age squared as important explanatory factors. The general finding is 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 or the permanent income hypothesis (Deaton 1992, Muradoglu and Taskin 1996, Spio and Groenewald 1996)\textsuperscript{29}.

We add a dummy which indicates whether households are in Brakwa or Benin. Earlier studies have pointed out that physical proximity to the providing institution is positively related to the uptake of insurance (Wang and Rosenman 2007). We also control for gender, education and employment status of the household head, assets owned by the household, land usage, and remittance receipt. Most existing studies investigate the association between wealth-related factors (including education) and the use of insurance. Surprisingly, there are several studies that do not find a significant relationship between education and insurance uptake (Wang and Rosenman 2007, Giné et al. 2008, Cole et al. 2009, Ito and Kono 2010). This might be due to the fact that it is not education as such that matters but rather the level of specific knowledge on insurance, or financial literacy in general, which has been found to be significantly related to insurance uptake (Giné et al. 2008). In their study on health insurance uptake, Wang and Rosenman (2007) show that education does matter for a household’s perception

\textsuperscript{28} The respective questions in the questionnaire were: “In your opinion is your household more or less exposed to health shocks/road accidents/economic shocks compared to other households in your village?”.

\textsuperscript{29} In short, in terms of the determinants of savings, the permanent income hypothesis differentiates between permanent and transitory components of income. While the first is defined as individual longtime income expectations and consumption over lifetime given the present level of wealth, the latter is the difference between actual and permanent income, which is not normally used for consumption and hence its marginal propensity to be used for savings is unity (Friedman 1957, Kelley and Williamson 1968). The life-cycle hypothesis predicts that individuals smooth their consumption evenly over their lives by accumulating savings during earning years and dissaving after retirement to maintain consumption levels (Ando and Modigliani 1963).
of the need for insurance but not for the final purchase decision. They explain that education relates to the ability of people to assess risk and the way insurance would mitigate it. Yet, whether or not a household finally decides to purchase insurance depends on different factors.

Table 1.2: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard error</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to take risk</td>
<td>0.38</td>
<td>0.030</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Illness</td>
<td>0.47</td>
<td>0.029</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Vaccination</td>
<td>0.53</td>
<td>0.030</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Risk assessment</td>
<td>0.07</td>
<td>0.060</td>
<td>-1.158</td>
<td>1.929</td>
</tr>
<tr>
<td>Death experience</td>
<td>0.43</td>
<td>0.030</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Illness experience</td>
<td>0.36</td>
<td>0.029</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other shock experience</td>
<td>0.15</td>
<td>0.021</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td>47.01</td>
<td>0.941</td>
<td>17</td>
<td>92</td>
</tr>
<tr>
<td>Age squared</td>
<td>2,479.54</td>
<td>95.736</td>
<td>289</td>
<td>8464</td>
</tr>
<tr>
<td>Share of dependents</td>
<td>0.53</td>
<td>0.017</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>0.61</td>
<td>0.030</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Benin</td>
<td>0.20</td>
<td>0.023</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Female head</td>
<td>0.43</td>
<td>0.030</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Schooling</td>
<td>6.51</td>
<td>0.317</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Employee/employer</td>
<td>0.14</td>
<td>0.020</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Assets</td>
<td>-0.17</td>
<td>0.052</td>
<td>-1.196</td>
<td>2.794</td>
</tr>
<tr>
<td>Land (ln)</td>
<td>0.55</td>
<td>0.035</td>
<td>0</td>
<td>2.83</td>
</tr>
<tr>
<td>Remittances</td>
<td>0.28</td>
<td>0.027</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors’ illustration.

Note: Households in the sample are weighted according to their sampling probabilities.

Employment status is measured as a dummy variable indicating whether the household head is employed (as opposed to self-employed or not occupied) or an employer. Even though we do not distinguish between formal and informal employment, we suppose that being employed or being an employer is related to more steady income streams. In order to control for potential endogeneity of as-
sets owned by the household, we use the lagged version of an asset index, which captures asset ownership five years ago\(^{30}\).

The inclusion of employment status as well as land size also follows from our review of the literature on borrowing behavior, while the inclusion of remittance receipt is motivated by the savings literature. With regard to the first, it has been found that investment plans are a much more important driver for the use of formal loans than they are for the use of informal loans. This is reflected in the finding that greater land holdings or area of operational holdings, less wage-labor income, higher price of output and different primary economic activities – factors associated with a higher need for capital in the household – are positively associated with the use of formal loans that are hence geared towards production purposes and asset management (Pal 2002, Swain 2002, Barslund and Tarp 2008). With regard to the latter, it has been found that the receipt of remittances appears to influence the timing of savings within the life-cycle of a household (Spio and Groenewald 1996).

1.6 Estimation Strategy

As in other studies on insurance consumption (Browne 1992, Outreville 1996, Giné et al. 2008), and similar to the literature of public service use (Lavy et al. 1996, Handa 2002, Fafchamps and Minten 2007), for example, our analysis is faced with the problem of limited variance on the supply side. Most studies of this kind therefore rely on reduced-form estimations of households’ use of a particular service assuming that use is a function of all arguments in a respective demand and supply function. As a matter of concern, supply side factors may not be (adequately) controlled for. In addition, some variables may simultaneously affect demand and supply and the distinction between them may be blurred for example if it were necessary to be formally employed to open up a savings account and hence also to purchase insurance. In the light of these concerns, we provided very detailed information on the supply of the Anidaso

\(^{30}\) Deviating from the approach in Giné, Townsend and Vickery (2008), we do not control for credit constraints in our estimations. On one hand, this is because our data do not allow for a good measure of credit constraints. On the other hand, the specific empirical model we apply, i.e. estimating the uptake of insurance and the use of credit simultaneously, makes it difficult to include credit-related information on the right-hand side of the estimation equation. Since we include variables for employment status, assets, and land usage, which are different measures of the wealth of a household, they may serve as an indication for credit constraints.
In order to investigate the correlates of households’ uptake of microinsurance and other financial services, we thus estimate a reduced-form multivariate probit model. Due to the connection to the Gaussian distribution, this allows for flexible modeling of the underlying association structure, i.e. the cross-dependencies in latent utilities across the different services, and straightforward interpretation of the parameters. The alternative choices in the estimation are represented by the five latent variables: use of insurance $I^*$, use of formal savings options $S_1^*$, use of informal savings options $S_2^*$, use of formal loans $L_1^*$, and use of informal loans $L_2^*$. Each latent response depends on a vector of explanatory variables $X$, unknown parameters $\beta_{S1}$, $\beta_{S2}$, $\beta_{L1}$, $\beta_{L2}$, $\beta_I$, and the stochastic components of the error terms $\varepsilon_{S1}$, $\varepsilon_{S2}$, $\varepsilon_{L1}$, $\varepsilon_{L2}$, $\varepsilon_I$. The latter consist of those unobservable factors which explain the marginal probability of making the decision for one of the choices. The set of explanatory variables included in vector $X$ is identical in the five equations, assuming that the same decision-making process underlies each choice.

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

$$
S_1^* = X^\prime \beta_{S1} + \varepsilon_{S1}
$$

$$
S_2^* = X^\prime \beta_{S2} + \varepsilon_{S2}
$$

$$
L_1^* = X^\prime \beta_{L1} + \varepsilon_{L1}
$$

$$
L_2^* = X^\prime \beta_{L2} + \varepsilon_{L2}
$$

The five equations from (1) may be expressed as five binary variables $Y_j (j = I, S_1, S_2, L_1, L_2)$ that take the value of 1 if the household uses a financial service, and 0 otherwise.

$$
Y_j = 1(X^\prime \beta_j + \varepsilon_j >0) \quad j = I, S_1, S_2, L_1, L_2
$$

Each of these functions can, of course, be estimated as single probit models. However, this would result in inefficient coefficients, if 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, in which non-zero correlation is possible and hence provides more efficient estimates (Jones 2007).

In this model, each $\varepsilon_j$ is drawn from a $J$-variate normal distribution with a mean of 0, and a variance-covariance matrix $\Sigma$, where $\Sigma$ has values of 1 on the leading diagonal and correlations $\rho_{j\neq k} = \rho_{kj}$ as off-diagonal elements. These cor-
relation terms represent the unobserved correlation between the stochastic component of each type of financial service (Capellari and Jenkins 2003).

The joint estimation of the five alternative equations (2) is based on a joint multivariate probability involving the evaluation of the loglikelihood over \( I = 1, \ldots, N \) observations

\[
\ln L = \sum_{i=1}^{N} \ln \Phi_i(\mu; \Omega)
\]

where \( \Phi_i(.) \) is the multivariate normal cumulative density function with arguments \( \mu_i \) and \( \Omega \), where

\[
\mu_i = (k_{i1,1}\beta_{s1}X_{i,1}, k_{i1,2}\beta_{s2}X_{i,1}, k_{i1,3}\beta_{d1}X_{i,1}, k_{i1,4}\beta_{d2}X_{i,1}, k_{i1,5}\beta_{f}X_{i,1})
\]

where \( k_{ij} \) are the corresponding sign variables that equal 1 if a household uses a given financial service, and -1 otherwise. In matrix \( \Omega \), the constituent elements are \( \Omega_{jj} \), where

\[
\Omega_{jj} = 1 \text{ for } j = 1, \ldots, 5
\]

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 (Capellari and Jenkins 2003, Greene 2003). Under the assumption \( \varepsilon \sim N(0, \Sigma) \) clarified above, the 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.

### 1.7 Estimation Results and Interpretation

The outcome of the multivariate probit regression, showing the APEs of the explanatory variables on the marginal probability to take up any of the five alternatives, is presented in Table 1.3. It is important to note that the outcome categories are not mutually exclusive; in other words, households with an Anidaso policy include those who use Anidaso alone as well as those who use it in addition to any (combination) of the four alternative financial services. The hypothesis that the correlations between the error terms of each equation are
The estimated correlation coefficients indicate that the residuals of the estimation functions are highly correlated for the formal financial services, indicating that they have very similar unobservable, household-specific determinants. While there is a very strong positive correlation between the use of formal savings and the use of formal credit, the correlation between the uptake of Anidaso and either of the other two formal services is also positive but not as high. The correlation coefficient between the unexplained part of the (simultaneous) use of formal savings and formal loans amounts to 0.98, between Anidaso and formal savings to 0.69, and between Anidaso and formal credit to 0.46. This provides some evidence for a mutually reinforcing relationship between the uptake of formal savings, formal loans, and microinsurance. In terms of the informal financial services, there is a negative correlation between the error terms of the informal credit equation and the insurance equation, and a positive one for the informal savings equation and the insurance equation. This conforms only partially to our expectation of a substitutive relationship between these services and microinsurance. Unobserved heterogeneity might here explain the positive correlation, as there might be households with lower discount rates which makes them save more and purchase more insurance. However, the correlation coefficients are not statistically significant, thus inhibiting a final conclusion here.

In the following, we mainly interpret the estimation results for the uptake of insurance. We elaborate on the findings for the other financial services only where these appear to be innovative. It is important to note at this point that any inference on causal relationships should be treated with the necessary caution because our analysis is based on cross-sectional data. Thus, we limit our interpretations to associations and do not intend to draw conclusions on causality.

We find that in contrast to the expectations derived from the benchmark model, but in line with Giné, Townsend and Vickery (2008), risk-averse households are significantly less likely to take up microinsurance. This is shown by a comparably large, positive marginal effect of the level of willingness to take risk in the insurance function. In terms of the other financial services, the coef-

31 Note that it would only be appropriate in the case of independent error terms to deal with the above model as independent equations, as explained in the estimation strategy. Nevertheless, we have also estimated the five choice functions as binary probit models (Table A. 3 in Appendix A). With few exceptions, the signs of the estimation coefficients remain the same. Generally, the significance levels are lower in the binary probit compared with the multivariate probit results.
ficients do not exhibit any statistical significance. This suggests that micro-insurance is not regarded as a mechanism to mitigate risk but rather as a risky undertaking itself. A rational explanation would be that policy holders do not fully understand the terms and conditions of the insurance, so that they do not trust in that the insurance company is willing to actually pay out the benefit in the case of a claim or is financially stable enough to even exist securing future claims in the long run. A similar finding was shown in Giné and Yang (2009).

In line with this interpretation is the result that households which consider themselves to be more exposed to risk than others are less likely to be Anidaso policy holders. We expected a positive relationship between the subjective exposure to risk and the use of microinsurance. However, it appears that the Anidaso policy is not perceived to be helpful in dealing with risk, at least as far as the risks included in the variable (illness, accident, economic shocks) are concerned. Since we do not know much about causality, it is important to mention that households which do not have access to insurance might be – and feel – more exposed to risk. Regarding the other alternatives, risk assessment is negatively associated with informal savings and positively associated with informal credit, showing larger marginal effects compared with the case of insurance. Since informal loans often serve as ex post coping strategies, this indicates that the risk assessment variable is a good indicator for true risk exposure.

From the predictions of the benchmark model, we expected a positive relationship between the objective size of the risk and the uptake of microinsurance. Indeed, we find a negative association between the vaccination status of the head of the household and the uptake of microinsurance. This might indicate that households with a head who has not received any vaccination tend to purchase the Anidaso policy more than households with a vaccinated head. Since vaccination is very cheap, it is irrational for household heads to not vaccinate and thus endanger their health and the health of the other household members. However, given that vaccination status is not public information and that it is not part of Anidaso’s eligibility criteria, this could be an indication for asymmetric information in the market, i.e. potential adverse selection. Yet, we acknowledge that vaccination status is only an imperfect measure of policy

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32 We repeated the estimation and substituted risk assessment by only the subjective exposure to health shocks, as this might be the type of risk most relevant for households’ decisions to take up the Anidaso policy. This did not change the signs and significance levels of the estimates, except for the fact that the respective coefficient in the formal loan function becomes insignificant.

33 We are grateful to an anonymous referee for pointing this out.
holders’ riskiness, and that illness of the household head in the previous year, which is also thought to measure riskiness, is not statistically significant. At the same time, illness of the household head is negatively related to the use of formal credit and positively to the use of informal credit. The marginal effect is particularly large for informal credit. Thus, it seems that households’ primary response in the case of the main breadwinner’s illness is to borrow from within their social networks.

We find mixed evidence for a bequest motive in the uptake of the Anidaso policy. On one hand, there is no significant relationship between the uptake of insurance and the share of dependents in the household or marriage status of the head. On the other hand, the coefficients for the age variables in the insurance function are of the expected sign and they are statistically significant. They suggest that there is a life-cycle effect in the uptake of the Anidaso policy; whether this life-cycle effect implies a bequest motive, however, is questionable due to the insignificant results of marriage status and share of dependents.

Interestingly, there also seems to be a life-cycle effect for the use of both formal and informal credit. With increasing age of the household head, households request more insurance and more credit, most likely because their experience with financial matters increases, their economic activities are more developed, and their family responsibility increases. Yet, this effect holds only up to a certain age and then reverses. The turning point for uptake of the Anidaso policy is precisely 47 years of age, for formal credit it is 60 years of age, and for informal credit it is 42 years of age. The fact that the turning point for uptake of the Anidaso policy is relatively low suggests that there is no saving-for-retirement motive at play. However, for those households who choose the savings component, the policy might still be seen as a savings instrument, irrespective of a pension. In addition, we find slight evidence for a life-cycle effect in the case of formal savings, which is in contrast to much of the literature on savings behavior in developing countries (Deaton 1992, Muradoglu and Taskin 1996, Spio and Groenewald 1996), but the effect is statistically significant only at the ten percent level.

According to our results, households with more well-educated heads are significantly more likely to purchase the Anidaso policy. This is in contrast to much of the earlier literature, which finds no significant relationship between education and the uptake of insurance (Giné et al. 2008, Cole et al. 2009, Ito and Kono 2010). Our deviating result might be due to the fact that we do not additionally control for financial literacy as many of the mentioned studies do.

34 The results do not change qualitatively when substituting the share of dependents by household size or the share of children in the household.
A higher asset index is positively and significantly related to the use of all formal financial services as well as informal savings, with particularly high marginal effects in the savings equations. This positive relationship is presumably due to the role of assets as collateral for formal loans on one hand and to assets being an indication of the socioeconomic status, and hence of financial literacy and availability of liquid resources for insurance and both formal and informal savings on the other hand\textsuperscript{35}. This is in line with the microfinance literature, which shows that microfinance typically does not reach the poorest households (Hulme and Mosley 1997, Navajas et al. 2000, Datta 2004).

Our results suggest that remittances work as a substitute for the Anidaso policy, 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 formal savings alternative. Households obviously regard insurance to be less necessary, if they are potentially able to access remittances in cases of future shocks and emergencies.

Residence in Benin is positively and significantly correlated with the uptake of the Anidaso policy (as well as informal savings). Since the bank providing the policy is located in Brakwa, it would have been more plausible to assume that there was a negative relationship due to the relative distance and hence higher transaction costs. However, it seems that the Benin dummy captures information different from pure distance. One possible explanation could be that the PIA, GLICO’s main local agent in the area, lives in and is part of the social community of Benin. Hence, trust in the insurance product and the local distributing institution may be enhanced through this personal contact, resulting in a higher likelihood of Benin households purchasing the policy, even though they are farther away from the bank office.

In order to analyse whether these results are specific to the type of microinsurance studied here, we replace the outcome alternative of uptake of the Anidaso policy by uptake of NHIS and uptake of all types of insurance available in the area and repeat the multivariate probit estimations. Table A. 4 (in Appendix A) shows the respective results. We do not illustrate estimates for the financial services other than insurance, as these change only marginally when substituting one insurance category by another. In column (1), we reproduce the results for the Anidaso policy from Table 1.3 to make comparisons easy. In columns (2) and (3), we report the estimates for the NHIS category and the all insurance cate-

\textsuperscript{35} When running the same regression with the asset index based on current asset levels (i.e. at the time of the survey), the results do not change remarkably. Thus, the potential noise in the regression due to the endogenous nature of assets might actually not be extraordinarily large.
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gory of the multivariate probit, respectively. Since the latter category includes all types of insurance available in the sample, including Anidaso, NHIS, and other private insurance policies, the results are likely to be more difficult to interpret. It is not clear to which type of insurance a particular association is to be ascribed, as a positive coefficient resulting from one type of insurance may be cancelled out by a negative coefficient from another type.

As can easily be seen, there are large differences in the estimation results for the Anidaso policy and the NHIS (as well as all insurance policies summarized). Most notably, the relationship between willingness to take risk and uptake of insurance is negative in columns (2) and (3), as the theory suggests, but it is not statistically significant. Hence, the NHIS, and possibly other insurances as well, is neither more preferable for risk-loving households, nor can we say that the likelihood to participate increases for risk-averse households.

Not surprisingly, illness of the household head in the previous year is positively and significantly related with the uptake of the NHIS, showing high marginal effects. The difference between the estimates in the Anidaso function and those in the NHIS function clearly stems from the fact that the former is a life insurance and the latter is a health insurance. It could also be related to the fact that NHIS is subsidized and free for the poorest. Therefore, in contrast to Anidaso, those who are poor and risk averse find it easier to take up NHIS. This, in turn, highlights the suggestion we made above to consider different types of insurance separately.

Similar to the case of the Anidaso policy, there is a strong positive association between residing in Benin and taking up NHIS, and possibly other insurance as well. This points out that the Benin dummy is not merely a measure of trust in the Anidaso policy and the staff distributing it, as the NHIS is not distributed by the same agents. It might instead be a measure of more dynamic interaction within and also between social networks in Benin, as this town is much smaller than Brakwa. The importance of exchange of information within social networks is emphasized in Giné, Townsend, and Vickery (2008). In contrast to the Anidaso policy, the relationship between the receipt of remittances and the purchase of NHIS is positive, indicating that remittances do not always act as substitutes for insurance. The determinants of this relationship remain unclear and seem to be an interesting topic for further research.
### Table 1.3: Multivariate Probit Results on the Use of Financial Services

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>(1) Microinsurance</th>
<th></th>
<th>(2) Formal savings</th>
<th></th>
<th>(3) Informal savings</th>
<th></th>
<th>(4) Formal credit</th>
<th></th>
<th>(5) Informal credit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>t-stat.</td>
<td>MEs</td>
<td>Coeff.</td>
<td>t-stat.</td>
<td>MEs</td>
<td>Coeff.</td>
<td>t-stat.</td>
<td>MEs</td>
<td>Coeff.</td>
</tr>
<tr>
<td>Willingness to take risks</td>
<td>0.16</td>
<td>1.13</td>
<td>0.008</td>
<td>0.09</td>
<td>0.47</td>
<td>0.030</td>
<td>0.01</td>
<td>0.03</td>
<td>0.002</td>
<td>0.09</td>
</tr>
<tr>
<td>Illness</td>
<td>0.24</td>
<td>1.57</td>
<td>0.012</td>
<td>0.05</td>
<td>0.24</td>
<td>0.016</td>
<td>0.12</td>
<td>0.66</td>
<td>0.046</td>
<td>-0.23</td>
</tr>
<tr>
<td>Vaccination</td>
<td>-0.29</td>
<td>-1.93*</td>
<td>-0.015</td>
<td>0.46</td>
<td>2.54**</td>
<td>0.157</td>
<td>-0.18</td>
<td>-1.01</td>
<td>-0.070</td>
<td>0.56</td>
</tr>
<tr>
<td>Risk assessment</td>
<td>-0.09</td>
<td>-1.15</td>
<td>-0.004</td>
<td>-0.01</td>
<td>-0.14</td>
<td>-0.004</td>
<td>-0.23</td>
<td>-2.69***</td>
<td>-0.093</td>
<td>0.01</td>
</tr>
<tr>
<td>Death experience</td>
<td>0.11</td>
<td>0.68</td>
<td>0.005</td>
<td>0.28</td>
<td>1.39</td>
<td>0.098</td>
<td>0.36</td>
<td>1.99**</td>
<td>0.143</td>
<td>0.22</td>
</tr>
<tr>
<td>Illness experience</td>
<td>-0.02</td>
<td>-0.15</td>
<td>-0.001</td>
<td>0.21</td>
<td>1.05</td>
<td>0.074</td>
<td>0.57</td>
<td>3.04***</td>
<td>0.225</td>
<td>0.46</td>
</tr>
<tr>
<td>Other shock experience</td>
<td>0.08</td>
<td>0.34</td>
<td>0.004</td>
<td>0.29</td>
<td>1.02</td>
<td>0.107</td>
<td>0.04</td>
<td>0.14</td>
<td>0.015</td>
<td>0.93</td>
</tr>
<tr>
<td>Age</td>
<td>0.15</td>
<td>3.74***</td>
<td>0.007</td>
<td>0.03</td>
<td>1.03</td>
<td>0.011</td>
<td>-0.07</td>
<td>-2.45**</td>
<td>-0.028</td>
<td>0.09</td>
</tr>
<tr>
<td>Age squared</td>
<td>-0.00</td>
<td>-3.71***</td>
<td>-0.000</td>
<td>-0.00</td>
<td>-0.67</td>
<td>-0.000</td>
<td>0.00</td>
<td>1.98**</td>
<td>0.000</td>
<td>-0.00</td>
</tr>
<tr>
<td>Share of dependents</td>
<td>0.04</td>
<td>0.13</td>
<td>0.002</td>
<td>-0.22</td>
<td>-0.68</td>
<td>-0.076</td>
<td>0.82</td>
<td>2.68***</td>
<td>0.326</td>
<td>-0.50</td>
</tr>
<tr>
<td>Married</td>
<td>-0.05</td>
<td>-0.25</td>
<td>-0.002</td>
<td>0.26</td>
<td>1.18</td>
<td>0.090</td>
<td>-0.37</td>
<td>-1.79*</td>
<td>-0.146</td>
<td>0.59</td>
</tr>
<tr>
<td>Benin</td>
<td>0.72</td>
<td>4.33***</td>
<td>0.056</td>
<td>0.13</td>
<td>0.59</td>
<td>0.045</td>
<td>0.30</td>
<td>1.54</td>
<td>0.119</td>
<td>-0.18</td>
</tr>
<tr>
<td>Female head</td>
<td>0.07</td>
<td>0.35</td>
<td>0.003</td>
<td>-0.54</td>
<td>-2.34**</td>
<td>-0.183</td>
<td>-0.48</td>
<td>-2.24**</td>
<td>-0.188</td>
<td>-0.09</td>
</tr>
<tr>
<td>Schooling</td>
<td>0.04</td>
<td>2.61***</td>
<td>0.002</td>
<td>0.06</td>
<td>2.97***</td>
<td>0.019</td>
<td>-0.04</td>
<td>-2.00**</td>
<td>-0.014</td>
<td>0.04</td>
</tr>
<tr>
<td>Employee/employer</td>
<td>0.04</td>
<td>0.17</td>
<td>0.002</td>
<td>0.99</td>
<td>3.68***</td>
<td>0.373</td>
<td>-0.28</td>
<td>-1.13</td>
<td>-0.111</td>
<td>0.50</td>
</tr>
<tr>
<td>Assets</td>
<td>0.36</td>
<td>4.67***</td>
<td>0.017</td>
<td>0.29</td>
<td>3.00***</td>
<td>0.104</td>
<td>0.39</td>
<td>3.90***</td>
<td>0.155</td>
<td>0.20</td>
</tr>
<tr>
<td>Land (ln)</td>
<td>-0.16</td>
<td>-1.07</td>
<td>-0.008</td>
<td>0.02</td>
<td>0.11</td>
<td>0.006</td>
<td>-0.17</td>
<td>-1.07</td>
<td>-0.066</td>
<td>0.19</td>
</tr>
<tr>
<td>Remittances</td>
<td>-0.16</td>
<td>-0.89</td>
<td>-0.007</td>
<td>0.49</td>
<td>2.47**</td>
<td>0.177</td>
<td>-0.01</td>
<td>-0.04</td>
<td>-0.003</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation.

Note: 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.
1.8 Conclusion and Scope for Further Research

It is the objective of this paper to contribute to the discussion on the correlates of households’ participation in microinsurance in developing countries. Different from previous studies we analyse the example of a micro life insurance. We also deviate from earlier work in our focus on the relationships between households’ decisions to take up insurance and to use other financial services. We argue that microinsurance does not enter a vacuum but joins a range of alternative informal and formal financial mechanisms used by households to diversify risk and cope with shocks. We assume that savings and loans could be either substitutes of insurance if they serve a risk management function or their use could reinforce the uptake of insurance if all services are provided by the same financial institution. In order to take into account that households tend to use more than one financial service simultaneously and that there may be interconnections between these, we estimate a multivariate probit model using data from a household survey of 350 households in two neighboring towns in the Central Region of Ghana.

Our estimation results provide evidence for a mutually reinforcing relationship between the uptake of micro life insurance, i.e. the Anidaso policy, and the use of other formal financial services. This is plausible as the Anidaso policy is distributed via local banks, which also offer formal savings options and formal loans. Since we do not know whether this relationship would hold if insurance was supplied and distributed by the insurer itself or via institutions outside the formal financial sector, it would be interesting to repeat our analysis for different provider models and/or in a different context, possibly a different country.

Our evidence does not suggest a substitution, or crowding out, effect between the use of informal savings and informal loans on the one side and uptake of microinsurance on the other side. More precisely, microinsurance does not appear to be simultaneously determined with informal savings or informal loans by the same unobservable, household-specific determinants. This finding is, in fact, not very surprising if we consider that the Anidaso policy covers only the risk of death (and potentially, accident and hospitalization), while households usually face many more risks, such as illness, harvest failure, or unemployment. The policy cannot serve to mitigate all relevant risks; and households simply need to apply other risk management strategies, such as risk sharing within social networks, as well.

In line with earlier studies on households’ microinsurance participation behavior, our estimation results reveal certain deviations from a neoclassical benchmark model. We show that risk averse households are less, not more, likely to participate in microinsurance. Furthermore, we find that households...
which feel more exposed to risk compared to their neighbors are also less likely to participate. Households seem to consider the Anidaso policy to be risky because they do not fully understand the insurance and all its terms and conditions. During our field work, we often got this impression from discussions with the households in our sample. Lack of information on the demand side is generally discussed as one of the most important challenges of micro-insurance in academic and policy makers’ circles. Our analysis calls this fact into mind again and emphasizes that major efforts are necessary in providing financial literacy to low-income households.

We find indicative evidence for the significant role of trust in the insurance provider and for the role of social networks found in earlier microinsurance studies. Households that live in the smaller one of the two towns in our sample, Benin, which is farer away from the bank office, are surprisingly more likely to purchase the Anidaso policy (and to participate in the NHIS). This is attributed to the fact that there might be a more dynamic interaction within and also between social networks in this smaller town, and that, in the case of the Anidaso policy, the insurer’s main local agent lives in and is part of the social community of Benin.

The findings are ambiguous as to the role of a bequest motive, which is usually part of basic life insurance demand models. Our results suggest that there is a life cycle effect in the uptake of microinsurance. Whether this effect is a sign of a bequest motive, however, remains unclear. We furthermore find indicative evidence for adverse selection in the uptake of the Anidaso policy. However, due to suboptimal variables to measure riskiness, we do not want to highlight this very much. We rather hope to see more research on the uptake of micro life insurance using better risk variables in order to investigate the issue of adverse selection further.

Re-estimation of our model taking households’ uptake of public health insurance (NHIS) into account reveals that the correlates of health insurance participation differ quite substantially from those of life insurance in general and possibly the Anidaso policy in particular. This stresses the need for additional studies on the uptake of microinsurance, especially with regard to those types of insurance that have not received much attention to date. Having said that, it appears to be desirable to conduct randomized experiments instead of cross-sectional household surveys in further analyses of microinsurance uptake. The main reason for doing so would be to deal with unobserved heterogeneity which might drive some of the results here. The researchers’ control over households’ selection into participation in randomized experiments allows generalization of findings to a much higher degree.