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Micro Life Insurance in Ghana of Foreign Policy Alignment with China

Abstract

This paper analyzes the determinants of households' decisions to purchase micro life insurance, the most common but least investigated type of microinsurance. It uses household survey data collected in southern Ghana in 2009. Insurance participation and extent of coverage are examined against a standard benchmark model, which argues that life insurance uptake increases with risk aversion, the probability of risk, initial wealth, and the "intensity for bequests." Many of these predictions indeed hold in the case of micro life insurance. However, the results of probit and tobit models show that nonstandard factors also explain the participation decision. Unlike the case with other available types of insurance, there is a significant negative association between households' subjective idiosyncratic risk perception and the uptake of micro life insurance. Additionally, households' micro life insurance participation is strongly related to their relationships with formal financial services providers and their membership in social networks. These findings suggest that poorer households view microinsurance as a risky option.

Keywords: vulnerability, household behavior, life insurance, Ghana

JEL classification: O16, G21, D12

Background to the paper:

This paper was developed in the context of a research project on household risk management and the participation in microinsurance markets by low-income households in sub-Saharan Africa. The project was conducted by the author together with Dr. Susan Steiner at GIGA from 2008 until 2010 and was funded by the DZ Bank foundation. An earlier version of this paper was presented at the Chronic Poverty Research Centre 2010 Conference, Ten Years of "War against Poverty," at the University of Manchester, 10 September 2010 and the annual AEL conference of the Verein für Socialpolitik, ZEF in Bonn, 22–23 June 2012. The author acknowledges the helpful comments provided by the participants of these conferences, Susan Steiner, Horst Zank, Sebastian Prediger, Tobias Lechtenfeld and Jann Lay.

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Subjective Risk and Participation in Micro Life Insurance in Ghana

Lena Giesbert

Article Outline

1 Introduction

Microinsurance markets have been growing rapidly in the developing world. This demonstrates the fact that the poor desire and operate with a whole range of financial services to accumulate capital and manage risk (Collins et al. 2009). Microinsurance is widely recognized as a formal tool that enables the poor to better cope with the consequences of shocks such as death, illness, droughts or floods, which often entail severe setbacks in these peoples' attempts to overcome their vulnerable livelihoods (e.g. Churchill 2002; Cohen et al. 2005; Dercon et al. 2008)

Several researchers have shown that, due to incomplete financial and insurance markets, poor households engage in income-smoothing activities that reduce temporary income fluctuations but often come at the cost of lower total returns to wealth (Rosenzweig and

Binswanger 1993; Murdoch 1995; Platteau 1997). A range of informal risk-sharing mechanisms that balance consumption variability to some extent, but usually not entirely, have been identified. In addition, the degree of consumption smoothing via informal risk-management strategies seems to be higher for wealthier households than for poorer ones (Murdoch 1995; Dercon 2002). At the same time, public social security systems and safety nets are typically weak and often cover less than 10 percent of the population in developing countries, the majority of whom are employees in the formal sector (ILO 2001). Microinsurance not only offers a direct welfare benefit through a payout in the case that an insurable loss occurs, it is also seen as an effective tool to prevent households from engaging in insufficient and costly alternative ways of coping with shocks.

The most frequent and stress-inducing risks in developing countries have been identified as illness; death of an income earner in the household; property loss as a result of theft or fire; and damaging events in agriculture, such as droughts and floods (Cohen et al. 2005; Dercon et al. 2008). Indeed, these risks correspond strongly to the types of microinsurance products offered today. In order of frequency, the latter include life insurance, accident and disability cover, property and index insurances, and health insurance.[1] Notwithstanding the potential of microinsurance to offer secure protection at affordable prices for poor households to hedge against some of the biggest risks they are exposed to, uptake rates have so far remained low. Although microinsurance products have been identified in 77 out of the 100 poorest countries of the world, in most of the countries they cover less than 5 percent of the total population (Roth et al. 2007).[2]

Common explanations of the low uptake rates are the target group's unfamiliarity with insurance, limited financial literacy among the target group, and poorly designed programs that do not match the demands of low-income households (Cohen and Young 2007; Matul et al. 2010). While these might be valid assumptions, there is still limited rigorous academic research on the various factors that determine households' participation in the microinsurance market.

However, although micro life insurance products are the most widespread in practice, empirical studies on them are limited (Giesbert et al. 2011; Arun et al. 2012) and analyses of conventional life insurance markets in developing countries are confined to a number of (cross-country) studies based on macroeconomic data (Browne and Kim 1993; Beck and Webb 2003). Based on the recent empirical microinsurance literature and theories on the de-

1 Although life insurance clearly outnumbers all other types of microinsurance, it is important to note that there exist numerous compound products, for instance, those that include life, hospitalization and disability insurance at the same time. In addition, more than 60 percent of life insurance products are, in fact, tied to a loan. These are often criticized as benefiting the lender rather than the policyholder (Roth et al. 2007).

2 Of the 500 million insured people, the majority of about 400 million are located in India and China; they nonetheless represent less than 5 percent of the total low-income population in these countries. The coverage of the poor in Africa and Latin America is approximately 5 percent and 10 percent, respectively (Churchill and Matul 2012: 11–12).

mand for life insurance, this paper aims to address the mechanisms behind participation in micro life insurance in Ghana. It departs from previous research on participation in micro life insurance in relation to the use of other financial services provided by the financial institutions in two villages in Central Ghana (Giesbert et al. 2011) in two ways. First, this study extends the previous work by focusing entirely on the local insurance market. It investigates households' participation in micro life insurance relative to other types of insurance, as well as the amount of coverage purchased by households as indicated by the percentage of total household income devoted to insurance premiums, using tobit, two-part and simple selection models. Second, it uses different data from a much larger household survey covering three regions across southern Ghana.

Existing empirical studies on the determinants of households' decisions to purchase different forms of microinsurance have provided some indication that beyond predictions obtained from neoclassical models, such as household wealth or risk aversion, behavioral factors – such as trust (Cai et al. 2009; Cole et al. 2009; Giesbert et al. 2011), familiarity with the product and the supplier, and the role of social networks (Giné et al. 2008) – are of overarching importance in households' decisions for or against microinsurance.

In the analysis of participation in microinsurance markets, risk preferences and objective measures of risk have been commonly acknowledged as standard factors in models of insurance demand. However, there is still limited knowledge about how the subjective evaluation of risk affects participation in microinsurance. As an alternative to standard expected utility theory and backed up by a number of empirical studies, prospect theory (Kahnemann and Tversky 1979) and psychological research on risk perception (e.g. Slovic et al. 1982; Böhm and Brun 2008) suggest that beyond the objective probability of risk, the decision to take up insurance may be greatly determined by the subjective perception and evaluation of risk.

Against the benchmark of the determinants typically derived from standard theories of life insurance participation – including risk aversion, the objective probability of risk (life expectancy), initial wealth, and the "intensity for bequests" – this paper places specific emphasis on two sets of nonstandard explanatory factors for the purchase decision. First, it addresses the role of subjective idiosyncratic risk perception within the household as opposed to the true level of exposure to the respective shocks. Second, it considers the effects of channels of information, the relationship of households with the institutions providing microinsurance and households' integration in social peer groups. These factors are assumed to be strongly connected to the formation of trust, which has been identified as a major determinant of microinsurance uptake by some of the previous studies in this field.

The paper proceeds as follows: Section 2 provides an overview of the characteristics of the insurance sector in Ghana and the features and distribution of the micro life insurance product. Section 3 reviews the major theoretical determinants of (life) insurance participation and empirical evidence from previous studies on participation in microinsurance markets. Section 4 then provides a description of the data and the econometric methods applied. Sec-

tions 5 and 6 present the descriptive statistics and the empirical results, and Section 7 summarizes the paper's findings and suggests directions for future research.

2 Characteristics of the Insurance Sector and Micro Life Insurance in Ghana

2.1 The Insurance Landscape

The insurance sector in Ghana has developed quite rapidly over the past decade, especially in terms of its expansion to semi-urban and rural areas. There are public insurance schemes – including the Social Security and National Insurance Trust (SSNIT) – that provide coverage for old age, as well as the broader public National Health Insurance Scheme (NHIS). SSNIT covers approximately 11 percent of the working population and is open for voluntary enrollment to both informal- and formal-sector workers, but it mainly covers formal employers and employees (Boon 2007). The NHIS was launched in 2004 and replaced the cash-and-carry healthcare system. It provides medical care for contributors and their dependents at public hospitals, certain recognized private hospitals, and health centers. Premiums are graded according to income, and particular groups – such as the elderly, indigent people, and pregnant women – are covered free of charge. The NHIS now covers approximately 66 percent of the total Ghanaian population and is well received, particularly in rural areas, where the majority of people hitherto went without health services as a result of their lack of resources and insurance alternatives (NHIA 2010). Additionally, there are a number of commercial insurers – such as Donewell or Unique – that offer a range of life and nonlife products, but without a clear orientation to the low-income segments of the population. Compared to the public insurance schemes, however, private insurance products' market penetration is still very low at less than 2 percent (Finmark Trust 2011).

While the microinsurance sector in Ghana is still small, a range of actors, including some of the commercial insurers and insurance intermediates, have started to enter the so-called "bottom line" of the market in recent years. According to market surveys, approximately 20 microinsurance products are provided by 15 regulated insurance providers. The majority of the products offered are life or funeral insurance products (Munich Re Foundation 2012). Moreover, health microinsurance has historically been provided by a range of small, community-based health insurers, also referred to as mutual health organizations.[3] While many of them have been integrated into the NHIS, some still operate independently. The outreach undertaken by microinsurance providers, however, has remained limited, especially beyond the capital Accra.

3 According to Osei-Akoto (2003), in approximately 42 out of 110 districts in the country at least one form of such health insurance schemes can be found – usually integrated into health care facilities (provider-based schemes).

The dominance of micro life insurance in the market is based on a range of factors. Generally, life insurance is the most prevalent type of insurance in the microinsurance business because it is simply easier to provide than many other types of insurance.[4] In addition, life insurance is typically one of the most demanded forms of coverage. In Ghana, there are also context-specific reasons for this. Not only may there be a long-term permanent loss in total household income if a working household member dies, but there is also an immediate need for funds to cover funeral costs, which are often substantial. In many Ghanaian communities a custom of stocking the corpses of deceased relatives for long periods, sometimes months, before they are buried has evolved. This is due not only to the economic interests of the facilities involved, but also to the fact that funerals are seen as an opportunity to demonstrate and enhance social status and prestige. The mortuary system is a part of the ritual norms to be followed and the length of the process and social get-togethers before the actual funeral takes place has increased over time. If access to sources of cash – such as loans and donations from social networks or remittances from migrants – is limited, these events may result in ruinous consequences for the remaining household (Arhin 1994; Geest 2006; Muzzucato et al. 2006).

The Gemini Life Insurance Company (GLICO) has long been the largest player among those insurers offering voluntary and independent microinsurance products in the Ghanaian market. Together with rural and community banks and other microfinance institutions in all the southern regions of Ghana, GLICO offers a micro life insurance called the Anidaso Policy, which is explained in more detail below.[5] While other players are now also rapidly increasing their client base, their outreach is still limited mostly to the capital.

The insurance products available to and used by households in the survey areas of this study include the aforementioned Anidaso micro life insurance and a few other insurances. These consist of private health, life, and property insurances offered by commercial insurance companies that are not specifically targeted to low-income households. Otherwise, health insurance is provided by the NHIS and private mutual health organizations (MHOs).

2.2 Distribution and Marketing of the Anidaso Policy

GLICO's Anidaso Policy is a term life insurance up to the age of 60, which is topped up with accident benefits and hospitalization benefits for the policyholder, the spouse, and up to four children. Policyholders may also, on a voluntary basis, add a so-called investment plan,

4 Due to the clear-cut nature of the loss event, it is relatively uncomplicated to price, and is mostly resistant to fraud and moral hazard and not dependent on the existence and efficient functioning of additional complex infrastructure, such as hospitals or rain gauge systems and the like. Moreover, it is easy to link to other microfinance products and to distribute via the delivery channels of microfinance institutions that have already built up good client relations with the target group. It is worth noting that this applies not only to the microinsurance market but also to the emerging conventional insurance markets in developing countries (Oetzel and Banerjee 2003).

5 "Anidaso" translates into "hope" in the Twi language, which is widely spoken in the capital area.

which serves as a savings scheme and pays the accumulated amount at the expiry of the term. The policy targets low-income people in both urban and rural areas.

As described in Giesbert et al. (2011), during the research project it became obvious that most policyholders were unaware of the accident and hospitalization benefits and instead considered Anidaso to be a pure life insurance policy or, to a lesser extent, a savings device. This observation was supported by the fact that GLICO has hitherto only received claims upon the death of policyholders.

In the sale and distribution of the policy, GLICO started to cooperate with rural and community banks (RCBs) and other microfinance institutions (MFIs) in early 2004 and currently collaborates with 26 such institutions in six regions of southern Ghana.[6] Ranging from approximately 200 to over 1,000 per financial institution, the total number of policyholders had reached 15,000 by December 2008.[7] A locally recruited personal insurance advisor (PIA) and sales agents are in charge of marketing the Anidaso Policy and run the operations between the bank and the insurance company. GLICO's marketing strategy includes approaching group and opinion leaders in the communities, attending the meetings of the rural banks or other (financial) self-help organizations and microfinance groups, holding public product launches, accompanying rural banks' mobile bankers, and approaching individuals at the bank or at home. There are only a few clearly defined eligibility criteria for policyholders. They must be adults below the age of 60 and must be willing to open an account with the local financial institution. Insurance premiums are directly deducted from policyholders' accounts.[8] No detailed health check or information on the health condition of applicants or other household members is required. The monthly premiums start at 2 Ghanaian cedi and go up to 10–15 cedi if policyholders choose the savings component.

3 Theoretical Predictions of Life Insurance Consumption

It is important to note that theoretical models of insurance consumption should be applicable to the case of microinsurance as well. According to the standard definition, "microinsurance is the protection of low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved" (Churchill and Matul 2012: 8). Thus it functions in the same way as regular insurance except that its clearly defined

6 RCBs are unit banks owned by members of the community and do not exclusively target low-income people. However, their business is strongly microfinance oriented because the majority of the population in their service areas can be classified as low-income (Steel and Andah 2008).

7 Please note that, unfortunately, no newer figures on the total number of policyholders have been made available to the author since then.

8 This can also be done via a group account. In the formal financial market, there are often financial groups that have a joint savings account and accumulate savings from their members in order to qualify for a loan (Steel and Andah 2008).

target group is low-income people. However, this is not to say that standard insurance theories capture all the relevant determinants of households' decisions to purchase microinsurance, as is further substantiated below. While the standard models of insurance consumption typically refer to the amount of insurance purchased, I assume that the identified determinants are equally relevant for the insurance participation decisions of households as such.

Stemming from the seminal work of von Neumann and Morgenstern (1944), expected utility theory and the concept of risk aversion have become the basic framework for the analysis of risk and the demand for insurance. This theoretical framework assumes that people are risk-averse and, because they exhibit diminishing marginal utility with respect to wealth, purchase insurance because they prefer the certainty of paying small premiums to secure future income streams to the risk of suffering a large financial loss when a shock occurs (Mossin 1968). Hence the effect of wealth on the decision to purchase insurance is strongly connected with the consumer's attitude towards risk. For example, with decreasing absolute risk aversion and increasing wealth, the willingness to pay for insurance – that is, the maximum amount paid to exchange the prospect of risk against a certain level of wealth – also decreases. Hence, insurance may be an inferior good (Pratt 1964; Mossin 1968; Arrow 1971).

Besides wealth as such, some literature considers the effect of liquidity constraints on insurance purchases in the presence of imperfect financial markets. These constraints are also ambiguous and may either enhance the demand for insurance, as they increase the need for future financial security, or may decrease it as premiums become too costly (e.g. Browning and Lusardi 1996).

In line with the expected utility framework and in a full-information setting, standard models of life insurance demand assume that consumers – and their households – maximize utility by reducing uncertainty in their income streams due to the possibility of a premature death of the primary income earner. Guided by the seminal work of Yaari (1965) and Hakansson (1969), most of the early theoretical studies focused on the demand for term life insurance and developed a life-cycle model in which the primary income earner maximizes his lifetime utility from consumption and from bequests. Hence, the standard approach includes a subjective weighting function for bequests; this is expected to increase as consumers marry or have offspring and to take on a hump-shape curve because the importance of bequests is greatest when the consumer dies at prime age.[9] Bequests may be either altruistically (Tomes 1982) or strategically (Bernheim et al. 1985) motivated.

It has also been argued that instead of a bequest motive, it is actually a precautionary savings motive that determines savings and insurance holdings over the life cycle. Pissarides (1980) points out that many life insurance policies include savings and annuity components.

9 One exception is Lewis (1989), who endogenizes shifts in the demand for insurance by explicitly incorporating the preferences of the dependents and beneficiaries into the model. Instead of including a weighting function of bequest it is then the offspring who purchase life insurance as they face an uncertain income stream as the result of a parent's uncertain lifetime.

As individuals normally survive until retirement age,[10] life insurance is primarily considered a "pension," while the bequest motive is satisfied by the fact that, in exchange for a reduction of the pension, the insured amount is made available to the consumer's dependents by the insurance company should the policyholder die before retirement. Preferences regarding the utility of bequests and that of consumption may differ over the lifetime, as the former may be discounted more heavily than the latter if the bequest motive of insurance purchases diminishes with age and, consequently, the retirement motive becomes more important. It has also been suggested that bequests are purely accidental, a claim that is substantiated by the observation that elderly people with and without children decumulate wealth at a similar rate (Hurd 1989) and that insurance holdings increase with increasing age for consumers both with and without dependents (Abel 1985). As the microinsurance under study incorporates features of term and whole life insurance, the bequest and/or savings motivation has to be established empirically.

Within the above framework, the consumption of life insurance is an (ambiguous) function of risk aversion and wealth. It increases with the desire to bequest or to save over the lifetime. It decreases with the costs, the subjective discount rate for current over future consumption, and the consumers' expected life span. In the extreme case, the latter factor may result in strong adverse selection – that is, the selection into the insurance scheme only by individuals with higher risk of preretirement death and bad health – whereas individuals with low risk probabilities will tend to opt out. This is a typical situation when there are information asymmetries in the market and the insurer is unable to account for this through corresponding price adjustments (Rothschild and Stiglitz 1976; Dionne et al. 2000). This is particularly the case if detailed health checks are not necessary or not possible before contracting insurance; this results in a strong informational advantage for consumers vis-à-vis the insurer regarding their individual risk exposure.[11]

However, several authors have pointed to insurance puzzles, as many households remain "under-" or "overinsured" given what the probability of the risk would justify. Particularly in the context of emerging (micro)insurance markets, alternative theoretical approaches may be of great importance as not all agents in the market may have perfect information and people may lack experience with and an understanding of formal insurance products.

Prospect theory and other psychological research on risk perception has shown that in cases where people lack concrete information and data they rely on intuition in their assess-

10 In the context of developing countries, this would refer to the period after regular productive work of primary income earners, which is normally not officially set at a certain age but depends on the individual's context conditions, such as his or her health and physical ability to work.

11 Note that moral hazard is typically not an applicable concept in the context of life insurance, as individuals do not tend to provoke the occurrence of the insured event. It can be an issue, however, in the case of other components of the microinsurance policy under study – that is, the health insurance and the endowment insurance components.

ment of risk and the related decision making. Individuals can thus make imperfect assessments of information (Böhm and Brun 2008; Slovic et al. 1982). For example, given a reference point of wealth, consumers tend to react in a risk-loving way when confronted with losses, but at the same time show risk-averse behavior in the gain domain. In addition, individuals tend to overvalue high-probability events, whereas they undervalue medium-probability and low-probability events (Slovic 1987; Kahnemann and Tversky 1979). Thus, insurance is purchased only when the subjective risk perception (due to overestimating the probability of an event) compensates for the undervaluation of a loss relative to the reference point. In addition, the expectation of risk realization (which would translate into a potential insurance payout) may be shaped to a great extent by the household's real experience with shocks, which results in a greater degree of wariness towards them (Rogers 1997). Hence, the more shocks households have experienced in the past and the higher their subjective exposure to risks in the future, the greater their willingness to purchase insurance will be. This might be of particular importance in the analysis of microinsurance participation given the relatively lower levels of wealth among the target group and the higher prevalence of uninsured risk in general, and prime-age adult death in particular, relative to their counterparts in conventional insurance markets.

While not explicitly considered in models of insurance consumption, models of financial market participation demonstrate that in the presence of strong information gaps and limited financial education, trust in the provider and peer influence become highly relevant. Guiso et al. (2008) show that the perception of risk is a function not only of the objective characteristics of a stock, but also of the consumer's subjective perception of the probability that he or she will be cheated. Less trusting individuals are thus less likely to participate in the stock market. Hong et al. (2004) propose that stock market participation is influenced by social interaction, in that consumers find it more attractive to invest in stocks when more of their peers participate. If this assumption is adapted to the case of micro life insurance, it can be expected that a higher level of trust in the provider and a higher level of social interaction within groups that are typically approached by the provider's sales staff will increase a household's willingness to buy a policy.

It is important to note that the available data does not allow for the empirical assessment of the time horizon of the above models of life insurance demand and instead relies on the cross-sectional variation of proxies related to the derived determinants. In addition, while the theoretical demand models capture the supply side at least in terms of the cost of life insurance (for example, the policy loading factor), it is not possible to distinguish between supply and demand with the data at hand. The reduced form analysis tries to address the problem of omitted variable bias to the greatest extent possible, for instance, by including regional and community fixed effects.

4 Empirical Evidence on Participation in Microinsurance Markets

While there is increasing interest in the study of microinsurance, empirical contributions from academia are still limited and have so far mainly concentrated on the analysis of health insurance (e.g. Schneider and Diop 2004; Dror et al. 2006; Chankova et al. 2008; Ito and Kono 2010) and agriculture-related index insurance (e.g. Sakurai and Reardon 1997; Giné et al. 2008; Cole et al. 2009; Clarke and Kalani 2012). Based on the existing evidence, however, it can be expected that participation patterns in (any) microinsurance markets are not necessarily consistent with the benchmark of the above insurance models. This section highlights some of the findings, which go beyond the main standard theoretical assumptions.

Giné et al. (2008), followed by Cole et al. (2009), show that Indian farmers' participation in rainfall insurance indeed matches some of the standard predictions of a model augmented with borrowing constraints. That is, insurance uptake decreases with expected income fluctuations, the credit constraints faced by a household, and basis risk – that is, the mismatch between the index and the actual expected losses covered by the insurance. It increases with household wealth. Contrary to the standard insurance theories, however, the authors find that risk-averse households are significantly less likely to take up insurance. Their results suggest that households that are unfamiliar with the insurance product and the distributing institution, or its staff, view purchasing insurance as a risky endeavor rather than a decision for safety. In the context of a government-subsidized product, Cai et al. (2009) show that Chinese farmers shy away from the insurance when they have little trust in the local government due to frequent experiences of policy delivery failures. Morsink and Geurts (2011) find that clients of a typhoon microinsurance in the Philippines rely on informal trust-building mechanisms (the experiences of claim payouts by trusted peers) as a substitute for formal trust-building institutions, thereby trying to reduce the risk of opportunistic behavior on the part of the insurer in the insurance transactions. Hence, trust between the insurance provider and a potential client seems to be a powerful explanatory factor in microinsurance uptake behavior.

Only a few studies have investigated the impact of subjective risk evaluation and individual perception on microinsurance uptake. Giesbert et al. (2011) find a highly negative relationship between the subjective risk assessment and the uptake of micro life insurance among households in Ghana's Central Region (n=350). Based on data from focus group discussions conducted in this region, Giesbert and Steiner (2011) show that many people's image of insurance is based on incomplete (and sometimes erroneous) information, or even on intuition. While people display a general openness and a positive attitude towards the micro life insurance, this leads to heavy disappointment and the consequent rejection of the scheme by some of those who have indeed purchased a policy. Positive as well as negative perceptions are channeled to other members of the target group, mainly via peers. Chankova et al. (2008) include a measure of the self-perception of health status in their empirical model on enrollment in mutual health organizations in West Africa, and Morsink and Geurts (2011) in-

clude measures on the perception of the risk of typhoons and accidents and previous experiences with both of these events in their analysis of the uptake of typhoon microinsurance. More in line with the theoretical reasoning of studies on risk perception and a priori common sense, both studies reveal a positive relationship between risk perception and enrollment in the respective insurance scheme.

Micro life insurance is still a very young financial product in the empirical setting of this study. It has only been offered for five to six years. Given the (as expected) low levels of financial literacy and the limited exposure to formal insurance in the survey region, it can be assumed that many households are indeed uncertain about the terms and conditions of the policy and/or do not really trust the insurer and the distribution channels. Enhanced access to information on, and experience with, other financial services offered by the same agencies and/or the guidance of trusted third parties, for example, social peers, may thus be of central importance for the uptake of the insurance product. However, households' engagement in social networks may also have an ambiguous influence as this could enhance their access to informal support networks in the event of shocks.

5 Data and Methodology

5.1 Source of Data

The analysis is based on a household survey of 1030 households conducted by the author in cooperation with the Institute of Statistical, Social and Economic Research (ISSER) of the University Legon in southern Ghana from January to March 2009. In an *ex ante* selection process, the author chose to study 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 at that time.[12]

In a subsequent step, the survey areas were selected. Communities in three service areas of the 26 financial institutions that distribute the policy were chosen. In order to ensure regional variation, these communities were selected from three different regions. In order to include a high share of low-income people from the overall population, we only considered RCBs that served semi-urban or rural areas, based on our assumption that people in these areas are on average poorer than people in highly urbanized areas (Ghana Statistical Service

12 When the selection of the microinsurance scheme was made (in 2007), all other providers on which information was available had an insufficient number of clients, offered only compulsory (mostly credit life) insurance, or provided health or heavily subsidized agricultural insurance. However, since information on microinsurance providers and products is fragmentary, it may well be that voluntary microinsurance products besides GLICO's Anidaso Policy existed that we were not aware of. Due to the dynamic nature of the market, it can be assumed that there are many more voluntary life insurance products today.

2007).[13] We also ensured that a sufficient density of bank clients held an Anidaso insurance contract. Out of eight possible survey sites that met the above criteria, we randomly chose three RCBs and their service areas. These were situated in

a) the Agona West Municipal District in the Central Region,
b) the Akuapim North District in the Eastern Region and
c) the South Tongu District in the Volta Region.

Within these service areas, the communities were deliberately chosen so as to include an equal share of

a) communities with a meaningful number of insured clients and
b) communities comparable in size, infrastructure and access to the rural bank's services without any insured clients.

In the total sample, microinsured households were oversampled, with a third of all households in the sample randomly drawn from Anidaso client lists in the localities with policyholders.[14] In the same localities, a third of noninsured households in the sample were randomly selected according to a counting procedure in each of the localities, with the counting interval set according to the official total number of households obtained from the 1998/1999 National Census. In the following discussion, these two sets of households from these communities are referred to as the "in-region sample." Finally, another third of households in the sample were randomly selected in the comparable communities without Anidaso policyholders, hereafter called the "out-region sample," using the same counting procedure described above. We thus included a total of 17 communities from three regions in the sample. Table A1 in the Appendix shows the number and share of Anidaso policyholder and nonpolicyholder survey households across these survey sites. The stratification of the sample according to microinsurance status is taken into account in the subsequent analysis through the use of appropriate survey probability weights.

While external validity in a strict sense may thus not be given, the scope for generalization goes beyond the local areas of the survey itself. First, the results should at least be representative of the semi-urban locations of the eight RCB service areas in southern Ghana where microinsurance is available. Second, similar financial institutions (RCBs and MFIs) are represented in every district capital and many other towns in the southern regions of Ghana. In principle, GLICO would distribute the Anidaso Policy through any formal financial institution that is willing and able to do so. However, it is not entirely clear why GLICO started with the current distributing institutions and not others.

13 Out of the 26 financial institutions, 14 were located in an urban setting and 4 had only inactive clients or a limited number of clients.

14 In the two towns in the Volta Region showing a meaningful number of insured clients, the overall number was still relatively limited, meaning that we had to use a full sample of the policyholders there.

5.2 Method

In order to analyze households' participation in the micro life insurance market, the estimation strategy follows a two-step approach. First, in line with the literature discussed above, the cross-sectional determinants of households' decisions to purchase or not purchase insurance can be specified in a discrete choice model as follows:

$$Y_i = X_i'\beta + \varepsilon_{1i}, \quad (2)$$

where the dependent variable Y_i takes on the value of 1 if a household has purchased micro life insurance, and 0 otherwise; β is a (K x 1) vector of unknown parameters; X_i is a vector of exogenous values for observation i of variables reflecting the benchmark model described above, additional variables assumed to be relevant for the uptake of microinsurance and a constant term (K=25-29); and $\varepsilon_{1i} \sim N(0,)$.

The probability that for a household i, given X_i we observe $Y_i = 1$ is estimated via a reduced-form probit model and may be formulated as

$$P(y_i = 0|X_i) = 1 - \Phi(\frac{\beta' X_i}{\sigma_i}) \quad (3)$$

Where Φ is the cumulative standard normal distribution function. Note that the results are only to be interpreted as conditional on the prevailing supply-side conditions described in detail above.

The variables intended to reflect the benchmark model include the following: The *level of wealth* of a household is measured by a (lagged) asset index derived from a range of productive and nonproductive assets and its second polynomial given potentially nonmonotonic effects of wealth;[15] a dummy variable indicating the household head is engaged in nonfarm activities; and the amount of land owned, the amount of remittances received per month and the amount of transfers (monetary and in-kind) received per month. The latter three variables are redefined as the logarithms of the corresponding variables as they are strongly nonnormally distributed – that is, highly skewed to the left. A dummy variable indicating the experience of a loan denial at a formal institution measures liquidity constraints. As a measure of the *objective risk*, the analysis includes the age of the household head and its second polynomial to capture potential life-cycle effects and the variable regarding the household's health status, measured as the share of (severely) ill household members in the last twelve months. Even though the insurance of interest here is not health but rather life insurance, the current health status also serves as a proxy for the probability of death. A dummy variable indicating whether or not the household head is risk-averse as opposed to risk-loving or risk-neutral reflects their *risk attitude*. It is based on data from a small decision experiment that was part of the survey. This experiment involved the chances of an additional payment (analogue to an insurance payout) in a hypothetical future scenario depending on the possibility of the household head becoming ill or remaining healthy (see Appendix 1 for a more detailed

15 The asset index is created by principal component analysis and captures the asset ownership five years ago in order to control, at least to some extent, for potential endogeneity.

explanation). It is important to note that not all of the subsequent model specifications include the risk-aversion dummy as a high number of missing values resulted in a strongly reduced and potentially biased sample. The simple dummy variable seems to be more reliable than the actual values of the risk-aversion parameter. The latter are highly inflated, reaching unrealistically high values (extremely risk-loving) in approximately 30 percent of the cases. It is possible that actual risk preferences do not strictly follow the assumptions of a quadratic expected utility function with constant relative risk aversion underlying the decision experiment, or that respondents had difficulties correctly understanding the procedures involved in the two decision exercises. Only about 60 percent of the total sample participated in the decision experiment, while the remaining respondents opted out as they did not understand it.[16] By using a simple dummy variable that shows only the general tendency of the risk attitude, the analysis avoids a strong bias as a result of the inflated values of the actual parameter. The motivation to *bequest* or to *save for retirement* via a micro life insurance is reflected by a dummy variable that indicates whether or not the household head is married, the share of children in the household, and the share of elderly dependents.

As discussed above, the analysis focuses on two sets of nonstandard variables that do more than simply test the predictions of the standard life-insurance-consumption models. Firstly, the household's *subjective perception of risk* is considered via a risk-perception index created through principal component analysis using polychoric correlations, which are able to adequately address the ordinal structure of the underlying variables (Kolenikov and Angeles 2008).[17] This index is based on three relatively simple questions about the household's subjective exposure to illness, accidents and (any) economic shocks relative to other households in the community, which are rated by the household head on a scale from one (much less exposed) to five (much more exposed).[18] The actual past experience of shocks is reflected by variables indicating the number of deaths and the number of economic shocks a household has indeed experienced in the last five years. These variables also serve as a control for the potential bias given higher (or lower) true levels of exposure to the main idiosyncratic shocks.

Secondly, some variables reflect the household's level of *familiarity* with institutions offering formal financial services in general and the provider of the Anidaso Policy in particular. At the household level, this is a variable denoting the number of years a household has used an RCB's services before the RCB introduced the Anidaso Policy. At the community level these are variables indicating the ratio of RCB clients in a community before the Anidaso Policy was introduced there and the ratio of *susu* clients in the community as proxies for the relative level of familiarity with and popularity of formal financial services offered by RCBs

16 Note that the data at hand does not allow me to control explicitly for a household's time preferences in terms of the discount rate of future consumption.

17 Note that the empirical data does not allow us to control for different risk preferences regarding gains or losses, but only for the subjective evaluation of the risk exposure regarding different types of risk. Also, the analysis does not use the parameters of the subjective assessment of health risks obtained from the decision experiment described in Appendix 1. Like the risk-aversion parameters, these do not seem as reliable as the risk perception index based on the simple and direct questions on comparative risk exposure.

18 The index is calculated using the *polychoricpca* command from STATA written by Stas Kolenikov.

and the prevalence of informal financial services, respectively.[19] The influence of *social networks* is measured by the number of groups the head is a member of, including, for instance, social community groups, occupational groups, or self-help groups. In addition, the analysis controls for gender, education and the access to media information of the household head, as well as for potential local or regional effects (using community or region dummies).

In a second step, the analysis takes into account the extent of micro life insurance coverage. The data does not allow us to measure micro life insurance ownership by the total insurance in force (the sum of all life insurance purchased), as is often done in the literature on the demand for conventional life insurance. However, in accordance with prior studies in the context of conventional insurance markets (e.g. Truett and Truett 1990; Burnett and Palmer 1984), the analysis uses households' premium expenditures as an alternative dependent variable. This variable combines the price with the level of coverage, but provides at least some indication of the actual coverage. As many of the households in the survey areas have not purchased micro life insurance, the dependent variable is here not strictly continuous but is rather limited to zero for a large number of the observations. This calls for the application of censored regression models, such as the tobit model (Tobin 1958). Although this is a widespread approach in the conventional insurance demand literature, in the microinsurance literature only Arun et al. (2012) have used it, in the context of micro life insurance in Sri Lanka. Following these authors, I define the dependent variable as the fraction of the total household income spent on premiums (in percent). The tobit model allows the dependent variable Y_i, denoting the percentage of household income paid for micro life insurance, to be censored as follows:

$$Y_i = \begin{cases} Y_i^* \; if \; Y_i > 0 \\ 0 \; if \; Y_i^* \leq 0 \end{cases} \quad (i = 1,2, \dots, N)$$

The observed variable Y_i is related to an unobserved latent variable, Y_i^*, for which parameters are estimated for the whole sample population, which can be specified as

$$Y_i^* = X_i'\beta + \varepsilon_{1i}, \qquad (i = 1,2, \dots, N), \tag{4}$$

with X_i representing the same vector of explanatory variables presented above and $\varepsilon_{1i} \sim N(0,)$. The log-likelihood function of the tobit model can then be formulated as

$$lnL = \sum_{i\epsilon\{Y_i=0\}} ln\Phi\left(\frac{0 - X_i'\beta}{\sigma}\right) + \sum_{i\epsilon\{0<Y_i\}} ln\frac{1}{\sigma}\phi\left(\frac{Y_i - X_i'\beta}{\sigma}\right), \tag{5}$$

where $\phi(.)$ is the standard normal probability density function and $\Phi(.)$ is the standard normal cumulative distribution function. Based on this, the parameters of the tobit model are estimated using the maximum-likelihood method. While these parameters are only meaningful when one is interested in the latent variable Y*, the effects of the explanatory variables on the realized variable (that is, the effects on the truncated mean of the dependent variable) are as-

19 *Susu* refers to a common informal mobile banking system in Ghana that includes savings and credit groups and typically involves mobile bankers who go round and collect savings from participants at a small fee. Participants can then obtain bigger lump sums of money at the end of an agreed term.

sessed using the procedure suggested by McDonald and Moffit (1980). These authors suggest decomposing tobit results into

1) "effects on the probability of being above zero, and
2) effects conditional upon being above zero."

In the following estimations, I calculate average marginal effects (transformations of (5)) with regard to the latent variable case as well as the second case based on the truncated observations using Stata's margins command.

The tobit model imposes relatively strict (normality) assumptions on the functional form. As tests on the conditions of normal and homogenous errors provide indications that even with the log-transformed variable the tobit model restrictions are not fully met, the analysis further includes specifications based on a two-part model and on a simple heckman selection model without exclusion restrictions.[20] Finally, the analysis undertakes robustness checks of the extent to which the predictions and expectations set out in the theoretical framework above are unique for the case of micro life insurance by comparing the results with estimations regarding participation in the NHIS and with estimations including all other (private) insurance policies available in the survey areas.

6 Results: Determinants of Participation and Coverage

6.1 Descriptive Statistics

Summary statistics are presented in Table 1. The wealth and demographic characteristics of the sample demonstrate that the survey areas cover semi-urban locations in the southern regions of Ghana, which are politically and economically dominant over the northern regions in the country. The sample includes low- and middle-income households with an average total income of 78.70 cedi per month per adult equivalent (approximately 62.95 USD), which is about twice the total national consumption poverty line. Closely in line with the national average, approximately 30 percent of the households in the sample fall below the poverty line.[21]

20 The two-part model combines the binary probit model with a conditional OLS regression on the non-zero observations and allows for the possibility that the zero and positive values are induced by different mechanisms, and not part of a simultaneous decision process as suggested by the tobit model. In addition, the simple selection model aims to correct the bias arising from the fact that those with non-zero premium expenditures may be non-randomly selected from the population and includes a selection equation on the probability of purchasing micro life insurance in the first place. While there are limitations in the selection models due to complex identification issues, the selection equation's assumption of nonlinearity potentially allows the higher power of regressors to function as a kind of pseudo exclusion restriction (Cameron and Trivedi 2009: 538–543). Nevertheless, the results should be treated with caution due to the potential misspecification of the model without a convincing exclusion restriction (Woolridge 2009). Note that it is not possible to calculate two-step selection models without exclusion restrictions based on the conditional expected values of Y when using survey weights.

21 The national consumption poverty line based on the most recent Ghana Living Standard Survey (GLSS) 2005/2006 is set at 370.80 Ghana cedi per adult equivalent per year (Ghana Statistical Service 2007). Note that

Even though all survey locations are considered locally as towns, approximately 50 percent of the households are engaged in farming, with mean landholdings of 5.119 acres. However, nonfarm activities are more widespread, with 69 percent of the households engaged in at least one such activity. On average, household heads have eight years of formal education. Nevertheless, 26 percent of the heads have not completed primary education and 33 percent of the heads report themselves as illiterate or unable to read and write properly.

Households that own micro life insurance show significant differences in certain characteristics compared to nonmicroinsured households.[22] On average, microinsured households have higher mean asset levels and their heads are much more engaged in nonfarm activities (88 percent to 68 percent). More of their heads are married, and they have a 23 percent higher share of their own children and a three times lower share of elderly dependents in the household. Surprisingly, according to their subjective evaluation microinsured households feel less exposed to risk. Correspondingly, they have experienced fewer cases of death in the past five years (0.22 to 0.29). In contrast, they have experienced more economic shocks than noninsured households during the same time (0.55 to 0.37). Microinsured households have used the services of a rural bank for more than three times as long as the population as a whole (in years); 10 percent and 15 percent more of them read the newspaper and listen to the news on the radio often, respectively; and their head is, on average, a member in 0.22 more social groups.

Microinsured households live in communities where there was a higher ratio of rural bank clients and a lower ratio of *susu* clients before the Anidaso Policy was introduced. Although all survey locations are within the service areas of rural banks, this finding provides some indication of an access barrier in terms of formal financial services in certain locations. This is elaborated upon in more detail in the later estimations. All of the differences in means mentioned are significant at the 1 percent level.

Table 2 reports the distribution of the different insurance categories considered and average monthly premium expenditures. The Anidaso Policy exhibits the lowest uptake rates with 2.09 percent of the households in the survey areas, while almost half of the households are enrolled in the NHIS. Hence, the households in the survey areas have had some exposure to insurance, but mostly with regard to the national health insurance. Conventional private insurance, which is not classified as "micro" insurance, is more commonly used than the Anidaso Policy, though mostly by households with above-average income levels. Comparing the average premium amounts per month paid for the respective types of insurance reveals that the Anidaso micro life insurance is indeed much cheaper than other private insurance, with mean premium payments of 5.44 cedi. Yet the national health insurance premiums are even lower with average premiums of 1.23 cedi.

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this is not an income-based poverty line, which means that figures for the sample are here likely to be underestimated as they are based on total income per adult equivalent and not expenditures.

22 Note that all averages are weighted by population size and survey stratification so that averages of nonmicroinsured households are close to full-sample averages due to the low uptake rates for microinsurance.

Table 1: Summary Statistics

Variable	Microinsured households mean	Non-microinsured households mean	Level of significance of difference in mean (percent)	Full sample mean	Std. Err.	Min.	Max.	Number of observations
Benchmark								
Risk aversion[a, b]	0.134	0.150		0.1498	0.020	0	1	647
Lagged asset index	0.395	-0.091	1	-0.081	0.042	-1.657	3.451	1031
Landsize per AE (in acres)	4.945	5.233	1	5.119	0.534	0	158.080	1031
Engaged in nonfarm activities[a, b]	0.884	0.683	1	0.688	0.020	0	1	1031
Income from remittances, per month	8.898	10.483		10.449	1.520	0	400	1031
Income from transfers/gifts, per month	6.610	7.750		7.726	0.952	0	200	1031
Total income per adult equivalent per month (Ghana cedi)	85.603	61.417	1	78.710	3.486	1.808	821.918	1031
Experience of loan denial[a]	0.203	0.094	1	0.097	0.012	0	1	1031
Share of severely ill HH members (last 12 mths)	0.208	0.208		0.208	0.013	0	1	1031
Share of ill HH members (last 12 mths)	0.665	0.692		0.691	0.015	0	1	1031
Age[b]	44.630	49.146	1	49.051	0.655	19	95	1031
Bequest motive								
Married[a, b]	0.643	0.532	1	0.535	0.021	0	1	1031
Share of own children in HH	0.427	0.347	1	0.349	0.012	0.000	0.857	1031
Share of elderly dependents in HH	0.019	0.060	1	0.059	0.008	0.000	1.000	1031
Subjective probability of risk								
Risk assessment index[b]	-0.261	-0.020	1	-0.025	0.046	-1.781	3.334	1011
Past experience of shocks								
No. of deaths (last 5 yrs)	0.221	0.285	10	0.282	0.025	0	6	1031
No. of economic shocks (last 5 yrs)	0.555	0.369	5	0.373	0.047	0	20	1031
Familiarity, networks and information								
Relationship to RCB before Anidaso (in yrs)	3.216	0.993	1	1.040	0.146	0	25	1031
Ratio of RCB clients in community before Anidaso	0.544	0.424	1	0.427	0.007	0.024	0.867	1031
Ratio of susu clients in community	0.161	0.188	1	0.189	0.004	0.012	0.474	1031
No. of groups memberships[b]	1.167	0.942	1	0.947	0.039	0	10	1011
Reads newspaper[a, b]	0.524	0.412	1	0.414	0.021	0	1	1011
Often listens to news on radio[a, b]	0.700	0.566	1	0.569	0.021	0	1	1011
Other variables								
Female-headed HH[a]	0.359	0.454	1	0.453	0.021	0	1	1031
Years of schooling[b]	10.090	8.115	1	8.167	0.223	0	26	1031
Unweighted number of observations	321	710		1031				
Weighted number of observations	507.37	23803.2		24310.5				

a: Dummy variable where 1 = yes; b: As reported by the household head. Source: Author's calculation based on survey data.

Table 2: Types of Insurance Used and Premium Expenditures

Type of insurance	No. of households in sample	Estimated no. of households in survey area	Estimated percentage of households in survey area	Average premium expenditures per month (Ghana cedi)*	Percentage of total income paid for premiums per month
Anidaso Policy	321	507.37	2.09	5.44	4.68
Other private insurance	161	2946.64	12.12	13.22	4.61
National Health Insurance (NHIS)	562	12602.00	51.84	1.23	0.97
Any insurance**	738	14536.80	59.80	5.60	4.01
Total	1031	24310.5	100		

Source: Author's calculation based on survey data.

* The exchange rate at the time of our survey (February 2009) was 1.00 Ghana cedi = 1.25 USD.

** This includes the Anidaso micro life insurance, other private insurances, national health insurance (NHIS) and public pension insurance (SSNIT).

This reflects the fact that the NHIS targets the population as a whole, including the poorest income segments, and is heavily subsidized by the central government. Thus, the national health insurance clearly falls into the category of microinsurance as well. However, except in the case of the (subsidized) NHIS, the percentage of total income spent for premiums is relatively similar across the different types of insurance, ranging from 4.01 to 4.68 percent.

6.2 Multivariate Analysis

Table 3 presents the probit estimation results on households' decisions to purchase micro life insurance, and Table 4 presents the estimation results of the tobit model, the two-part model and the selection model regarding the extent of coverage. For the probit and tobit models, I provide the estimated coefficients as well as the implied average marginal effects, which show the change in the underlying probability with a one-unit change in the explanatory variable and all other covariates kept at the sample mean. Based on the same regression techniques, tables A5 and A6 in the Appendix provide the estimation results on participation in and coverage through the NHIS and all types of insurance held by households. I highlight these in comparison with the results on micro life insurance wherever it is informative.

The first two specifications of the probit results show estimations based on the full sample, which includes policyholder locations (in-region) and non-policyholder locations (out-region) in the RCB service areas. All further specifications shown in the subsequent columns and in Table 4 report results from a reduced sample containing only the in-region households.

Table 3: Probit Estimation Results on Anidaso Microinsurance Participation

Explanatory variables	Based on total sample						Based on in-region sample						
	(1)[a]			(2)			(3)			(4)			
	Coeff.	S.E.	AME	Coeff.	S.E.	AME	Coeff.	S.E.	AME	Coeff.	S.E.	AME	AME scaled by population uptake rate
Benchmark													
Risk aversion[b] (Alpha<1)				-0.125	0.162	-0.006	-0.059	0.151	-0.003				
Lagged asset index	0.164***	0.052	0.007	0.181**	0.071	0.008	0.165**	0.078	0.010	0.130**	0.064	0.008	0.383
Lagged asset index squared	-0.066***	0.021	-0.003	-0.106**	0.046	-0.005	-0.123**	0.051	-0.007	-0.083**	0.037	-0.005	-0.239
Landsize per AE (log)	-0.020	0.038	-0.001	-0.022	0.030	-0.001	0.001	0.029	0.000	-0.008	0.025	-0.000	0.000
Engaged in nonfarm activities[b, c]	0.373***	0.114	0.017	0.579***	0.155	0.026	0.625***	0.166	0.036	0.422***	0.123	0.024	1.148
Income from remittances (log)	-0.008	0.028	-0.000	0.054*	0.032	0.002	0.064*	0.033	0.004	0.001	0.028	0.000	0.000
Income from transfers (log)	-0.001	0.028	-0.000	0.008	0.031	0.000	0.010	0.033	0.001	0.003	0.027	0.000	0.000
Experience of loan denial[c]	0.338***	0.126	0.015	0.585***	0.153	0.026	0.229	0.194	0.013	0.472***	0.155	0.027	1.292
Share of ill HH members (last 12 mths)	0.381**	0.189	0.017	0.223	0.186	0.010	0.552***	0.176	0.032	0.300**	0.149	0.017	0.813
Age[b]	0.067***	0.016	0.003	0.089***	0.034	0.004	0.111***	0.039	0.006	0.079***	0.026	0.005	0.239
Age squared[b]	-0.001***	0.000	-0.000	-0.001***	0.000	-0.000	-0.001***	0.000	-0.000	-0.001***	0.000	-0.000	0.000
Bequest motive													
Married[b,c]	-0.066	0.121	-0.003	-0.146	0.141	-0.007	-0.050	0.142	-0.003	-0.067	0.120	-0.004	-0.191
Share of children	0.517***	0.158	0.023	0.687***	0.226	0.031	0.673***	0.237	0.039	0.517***	0.191	0.030	1.435
Share of elderly dependents in HH										-0.517	0.398	-0.030	-1.435
Shocks and subjective risk													
No. of death shocks (past 5 yrs)	-0.032	0.080	-0.001	-0.186*	0.109	-0.008	-0.059	0.111	-0.003	-0.050	0.094	-0.003	-0.144
No. of economic shocks (past 5 yrs)	0.041**	0.019	0.002	0.092**	0.037	0.004	0.103**	0.045	0.006	0.105**	0.042	0.006	0.287
Risk-perception index, polychoricpca[b]	-0.103***	0.039	-0.005							-0.102**	0.041	-0.006	-0.287
Familiarity, networks, information													
Relationship to RCB before Anidaso (in yrs)				0.087***	0.015	0.004	0.113***	0.018	0.007	0.065***	0.014	0.004	0.191
Ratio of RCB clients to nonclients in community before Anidaso	1.193***	0.320	0.054	1.373***	0.257	0.062	-0.006	0.389	-0.000	0.026	0.316	0.002	0.096
Ratio of *susu* clients in community	-2.373**	1.199	-0.107	-3.058***	0.947	-0.137	-0.719	0.863	-0.042	-0.777	0.670	-0.045	-2.153
No. of group memberships[b]				0.062	0.077	0.003	0.009	0.080	0.001	0.084*	0.046	0.005	0.239
Reads newspaper[b, c]				-0.051	0.134	-0.002	-0.129	0.143	-0.007	-0.283**	0.118	-0.016	-0.766
Often listens to news on radio[b, c]				-0.089	0.130	-0.004	0.022	0.132	0.001	0.030	0.108	0.002	0.096
Other controls													
Years of schooling[b]				-0.001	0.014	-0.000	-0.020	0.015	-0.001	-0.004	0.013	-0.000	0.000
Female-headed HH[c]				-0.205	0.158	-0.009	-0.244	0.158	-0.014	-0.284**	0.132	-0.016	-0.766
Central Region[c]	0.106	0.126	0.005	0.478***	0.144	0.021							
Eastern Region[c]	-0.085	0.220	-0.004	0.044	0.181	0.002							
Community controls	No			No			yes			yes			
Constant	-4.089***	0.484		-4.875***	0.804		-4.573***	0.865		-3.796***	0.606		
Observations	1011			646			448			671			
F-statistic				(25, 596) 4,13			(28, 400) 3,04			(28, 642) 3,35			
Pseudo R-squared	0,121												

Notes: a = With probability weights and std. err. clustered at community level. b = As reported by the household head. c = Dummy variable where 1 = yes. Households in the sample are weighted according to their sampling probabilities. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. Source: Author's calculation based on survey data.

Table 4: Tobit, Two-Part and Selection Model Results on the Amount of Anidaso Premiums as % of Total Income, Per Month[a]

Explanatory variables	Tobit model								Two-part model		ML simple selection model	
	(1) nontransformed				(2) lognormal				(3) OLS lognormal: 2nd part		(4) Heckman: outcome eq.	
	Coeff.	SE	AME for E(Y|X,Y>0)	AME for E(Y|X)	Coeff.	SE	AME for E(Y|X,Y>0)	AME for E(Y|X)	Coeff.	SE	Coeff.	SE
Benchmark												
Lagged asset index	1.714	1.072	0.185	0.043	0.672*	0.380	0.032	0.356	-0.275***	0.074	-0.272***	0.074
Lagged asset index squared	-1.162**	0.589	-0.125	-0.029	-0.465**	0.216	-0.022	-0.246				
Landsize per AE (log)	-0.284	0.390	-0.031	-0.007	-0.123	0.152	-0.006	-0.065	-0.021	0.036	-0.022	0.036
Engaged in nonfarm activities[b, c]	5.620***	2.007	0.606	0.141	2.331***	0.719	0.109	1,234	-0.332	0.213	-0.290	0.263
Income from remittances (log)	0.029	0.405	0.003	0.001	0.004	0.160	0.000	0.002	-0.029	0.035	-0.029	0.035
Income from transfers (log)	0.183	0.415	0.020	0.005	0.087	0.159	0.004	0.046	-0.084**	0.033	-0.082**	0.033
Experience of loan denial[c]	5.288**	2.277	0.570	0.133	1.932**	0.833	0.091	1.023	0.028	0.153	0.062	0.201
Share of ill HH members (last 12 mths)	6.666***	2.377	0.719	0.167	2.744***	0.890	0.129	1,453	-0.160	0.212	-0.119	0.252
Age[b]	1.188***	0.408	0.128	0.030	0.496***	0.150	0.023	0.263	-0.007	0.006	-0.008	0.008
Age squared[b]	-0.014***	0.004	-0.002	-0.000	-0.006***	0.002	-0.000	-0.003				
Bequest motive												
Married[b, c]	-0.612	1.870	-0.066	-0.015	-0.194	0.717	-0.009	-0.103	0.061	0.176	0.060	0.176
Share of children	7.197**	3.057	0.776	0.181	2.916***	1.111	0.137	1,544	-0.270	0.217	-0.202	0.305
Shocks and subjective risk												
No. of death shocks (past 5 yrs)	-1.308	1.394	-0.141	-0.033	-0.390	0.537	-0.018	-0.206	-0.186*	0.111	-0.189*	0.113
No. of economic shocks (past 5 yrs)	1.484**	0.597	0.160	0.037	0.589***	0.216	0.028	0.312	0.051	0.033	0.060	0.046
Risk perception index, polychoricpca[b]	-1.480**	0.655	-0.160	-0.037	-0.609**	0.241	-0.029	-0.323	0.130**	0.061	0.120*	0.069
Familiarity, networks, information												
Relationship to RCB before Anidaso (in yrs)	0.907***	0.210	0.098	0.023	0.366***	0.067	0.017	0.194	-0.008	0.009	-0.002	0.021
Ratio of RCB clients in community before Anidaso	1.042	13.61	0.112	0.026	0.041	5.383	0.002	0.022	omitted		1.326	1.034
Ratio of *susu* clients in community	-18.408	37.15	-1,986	-0.462	-5.526	14.65	-0.259	-2,926	omitted		-6.505**	3.051
No. of groups head is member of	1.177	0.730	0.127	0.030	0.443	0.280	0.021	0.235	-0.003	0.079	0.007	0.082
Reads newspaper[b, c]	-3.628**	1.839	-0.391	-0.091	-1.482**	0.688	-0.070	-0.785	-0.269*	0.141	-0.293*	0.149
Often listens to news on radio[b, c]	0.358	1.745	0.039	0.009	0.028	0.651	0.001	0.015	0.266*	0.155	0.268*	0.156
Other controls												
Years of schooling[b]	-0.021	0.185	-0.002	-0.001	0.002	0.073	0.000	0.001	0.006	0.014	0.007	0.014
Female-headed HH[c]	-3.062	2.038	-0.330	-0.077	-1.304*	0.771	-0.061	-0.691	0.499**	0.195	0.486**	0.197
Community controls	Yes				Yes				Yes		Yes	
Constant	-59.240***	11.73			-25.615***	3.694			0.816	0.643	1.550	0.984
Observations	652				652				296		652	
Left-censored observations	356				356							
Diagnostics and goodness of fit									R-squared 0.298			
F-test (28, 623)	1,490				5,240				Athro		0.114	0.364
Normality test (tobcm) Null: normal errors (p-values)	0,000				0,000				Lnsigma		-0.081	0.059

Notes: a = Based on in-region sample only. b = As reported by the household head. c = Dummy variable where 1 = yes. Households in the sample are weighted according to their sampling probabilities. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.. Source: Author's calculation based on survey data.

The decision to concentrate on the in-region, rather than the full sample, is based on the assumption that there is a clear selection into the microinsurance scheme based on access conditions related to the services of the RCBs in general. This is reflected by the highly significant effects of the community-level variables that indicate the ratio of RCB clients in the community before Anidaso was introduced and the ratio of *susu* clients (that is, users of informal financial services) in the community. Both variables have the strongest effect in the overall model, demonstrating that with each additional RCB client per nonclient in the community, the probability that community members will purchase micro life insurance increases by 5.4 percentage points and that with each additional *susu* client per nonclient in the community the probability decreases by 10.7 percentage points. This raises questions regarding the systematic neglect of certain communities by the agents of rural banks, or the presence of other constraints, such as high transaction costs associated with the geographical distance to the rural banks. The inhabitants of the out-region communities may hence be prevented from consuming formal financial services to the same extent as the inhabitants of the in-region communities in the sample and instead resort to informal ones, as the *susu* variable shows. In order to ensure the comparability of households in the sample, the same estimations are performed only for the in-region sample. Except for the above community-level variables, which lose significance, this does not change the core results (significance levels and magnitude of effects) dramatically. However, all further discussion refers to the specifications based on the in-region sample only.

With regard to the standard theoretical predictions, the core results are robust across all the different specifications. Micro life insurance uptake does not monotonically decrease with the level of wealth, as Giné et al.'s application of a standard model to micro rainfall insurance in India suggests (2008); rather, the relationship takes on a hump-shape form, as shown by the significant positive effect of the level term and the significant negative effect of the quadratic term of the asset index. This is in line with recent results on the uptake of micro index insurance in Ethiopia (Clarke and Kalani 2012) and indicates that uptake of micro life insurance is lowest for households with very low and very high wealth and highest for those with intermediate levels of wealth. The financial barriers faced by the low-income households are also identified by the households themselves as the main reason why households do not purchase any insurance (see Table A2, Appendix). While the tobit results do not show significant effects of the asset index as well as remittances and transfers on the percentage of income spent on premiums, the results of the two-part and the selection models underline the reversing effect of these wealth indicators, which is demonstrated by the significant and negative coefficients of the asset index and transfers in the second-step equations (Table 4).

Whether or not the head is engaged in nonfarm activities has a significant positive effect on the probability of purchasing micro life insurance and the amount of coverage in the probit and tobit models. For a household with an initial uptake probability at the population mean, having a head who is engaged in nonfarm activities doubles the probability of micro-

insurance uptake.[23] In contrast, the second-step equations of the two-part and the selection model show a negative (though insignificant) effect for the variable.

These findings on the wealth indicators do not seem to be unique to the case of micro life insurance, but apply to the NHIS and the all-insurance category as well. The nonlinear relationship of the asset index with insurance uptake is robust throughout all specifications. Transfers, remittances and nonfarm employment seem less important for participation in other insurances relative to micro life insurance. This suggests that activities in the nonfarm sector facilitate a greater ability to afford the regular monthly premium payments for the Anidaso Policy through more steady and reliable incomes. This is less important, for example, in the case of the NHIS, to which premiums can be paid on a yearly basis. However, in a similar manner, these variables all point in a negative direction in the second-step equations on the nonzero premium expenditures, with nonfarm activities showing significance at the 5 percent level and remittances at the 10 percent level (tables A5 and A6, Appendix). Remittances may hence serve as a substitute for insurance expenditures.

While the simple risk-aversion dummy cannot be confidently included in all specifications due to the limitations of potential measurement error discussed above and a severe reduction in the sample size, it turns out to be negative (though not significant). In terms of the objective size of the risk, the results show, as expected, a strongly significant positive relationship with the household head's age in the participation equation. Yet the coefficient of the squared term is significant and negative (Table 3). The turning point in the relationship is at a relatively young age of 41.54 years. This finding speaks strongly in favor of a bequest motive, which is further substantiated below. It might also indicate that for the older generation the cost of evaluating and accepting new products and technical procedures increases. There is also a significant positive association between the share of severely ill household members and the probability of uptake as well as coverage. An increase in this share from the mean of 20.5 percent by 10 percentage points increases a household's probability of purchasing micro life insurance by approximately 0.17 percentage points. Given that the health status of the household is not public information and that customers are not obliged to report this in the Anidaso Policy admission application, this is an indication, albeit a small one, of adverse selection in the market. The same positive and even larger marginal effect of the share of ill household members also holds in the case of the NHIS probit and tobit models (Table A5).

As for the bequest motive hypothesized above, the results indicate that this motivation outweighs any potential intention to save for retirement with regard to the participation decision, but is less important in the decision about how much coverage to purchase. This finding seems convincing as higher premium payments also indicate that a household has cho-

23 Scaling the marginal effects by the mean population insurance participation rate indicates the percentage change in the uptake probability for a one-unit change in a respective explanatory variable for a household whose initial probability of purchasing the Anidaso Policy is at the population average.

sen an optional savings component in addition to the basic term life component.[24] The average marginal effects of the variables indicating a bequest motive are all smaller for the left-truncated mean of the log-transformed premium expenditures, that is, the non-zero observations in the tobit model specifications. In the two-part and the selection models they are negative and insignificant (Table 4). In terms of the participation decision, the bequest motive seems to be largely driven by the desire to bequeath children rather than the spouse. Marital status has a negative (though insignificant) effect. However, an increase of the mean share of children in the household (37.4 percent) by 10 percentage points significantly increases the probability that the household will purchase micro life insurance (by 0.2 percentage points). The coefficient of the share of elderly dependents, on the other hand, is negative but insignificant. These findings are in line with recent evidence of an intentional bequest motive in micro life insurance participation in Sri Lanka (Arun et al. 2012).

The results here match well with households' self-reported reasons for buying the Anidaso Policy, as provided in Table A2 in the Appendix. While the majority of households (57.58 percent) report the very broad reason as "to secure against future shocks," the second most common reason is "to protect family in case of illness/death" (23.80 percent). Only 8.79 percent of the households report that they have bought the Anidaso Policy for investment reasons (Table A2, Appendix). Instead of saving for retirement, however, these households might also want to use the option of a partial withdrawal of the insured amount mentioned earlier. Furthermore, the previous experience of a loan denial has a significant positive effect on the participation decision as such (Table 3). While credit-constrained households may be driven towards other options to protect against risk, there are also some indications that clients view the Anidaso Policy as one option for improving their reputation at the bank – that is, as an alternative to collateral that will later allow them to access a loan. This was brought up in discussions with GLICO's sales agents and rural banks' staff, and in focus group discussions conducted by the author in the Central Region. Furthermore, some sales agents have apparently used this as an argument to convince people to buy a policy. Correspondingly, 5.13 percent of the households directly indicate that they have bought the policy "to obtain collateral for a loan" (Table A2, Appendix). Supporting this story, the variable is not of such relevance for the actual amount of coverage purchased, as a much lower average marginal effect on the above-zero expected values of the dependent variable in the lognormal tobit specification and a nonsignificant effect in the second steps of the two-part and the selection model show (Table 4).

24 Unfortunately, it is not possible to identify exactly whether households have chosen such an additional component. This is due to the fact that (a) households are typically not sure about the amounts of premiums they pay for the basic term insurance and for the savings component and (b) the premiums paid for the basic coverage varied over the survey sites and over the years since the introduction of the policy and it was impossible to obtain any clear information on this.

As hypothesized above, there may be two major sets of factors that are of particular importance for participation in microinsurance markets and go beyond the standard theoretical predictions. First, these include the perceived and actual risk exposure. Second, these are the level of information households possess regarding insurance and financial services in general and their level of trust in the providing institutions. Both sets of factors are expected to work in favor of the uptake decision and the extent of coverage as their levels increase.

Yet in contrast to a priori theoretical considerations – but in line with the negative effect of risk aversion – households with a higher perceived risk exposure compared to others in their neighborhood are less likely to purchase the Anidaso Policy. In line with the earlier evidence provided by Giesbert et al. (2011) with regard to Ghanaian household data from two towns in the Central Region, the risk perception index exhibits a strongly significant negative effect on the participation decision. This effect is robust throughout all probit and tobit specifications (tables 3 and 4). Increasing the risk perception index from the minimum to the maximum value decreases the probability that a household will purchase Anidaso by approximately 2.3 percentage points. Interestingly, however, this effect is reversed in the second-step equations of the two-part and the selection models (Table 4). Hence, households that have purchased the policy behave as expected: pessimists with a higher exposure to risk purchase more extensive coverage (including more family members and/or the pension component). A one-unit increase in the risk perception index leads to a 12–13 percent higher fraction of income paid for premiums. Recall that, evidently, these are the households with intermediate levels of wealth, a higher share of children and a higher objective degree of risk. Underlining this finding, the negative effect of the risk perception index on participation decreases with rising asset levels, as shown by the distribution of the average marginal effects across the range of the asset index (Figure A2, Appendix). In contrast to the microinsurance participation equation, in the regression models of the other insurance categories the subjective risk perception index shows the expected positive significant coefficient in the tobit specification and the first parts of the two-part and the selection models (tables A5 and A6).

These findings can be interpreted in somewhat conflicting ways. On the one hand, one could argue that households do not use their perceptions to cope properly with the risk due to irrationality or limited (financial) understanding (Giné et al. 2008). They may have a limited ability to calculate the probability of the risk involved (prime age death and old age) and judge its potential implications. On the other hand, given that the life insurance under study does not provide full coverage, as may be the case with health insurance or indemnity insurance, the lower uptake among households with higher perceived levels of risk and lower levels of wealth may be the result of rational choice, as Clarke argues in his model of rational hedging (2011) and its empirical application regarding index insurance in Ethiopia (Clarke and Kalani 2012). This may be the case if there are strong expectations that, given the cost of the policy, the potential net payout of the insurance will not match either the financial loss incurred through the death of the insured household member(s) or the financial needs of old age.

A third explanation that is supported by a growing body of evidence is that of incomplete information and limited experience with the microinsurance product and the providing institution on the part of the household. This results in limited trust in the functioning and reliability of both. Households with a higher awareness of risk also tend to be more cautious and may draw back from the uncertainty associated with the policy. In fact, the policy itself might then be considered a risky option and thus not perceived as helpful in dealing with the consequences of death or old age. Both of the latter two interpretations are supported by the findings for the NHIS and the all-insurance equations, where households seem to behave in line with the theoretical reasoning. These types of insurance seem to be regarded as adequate mechanisms to deal with the associated risk, a finding that is convincing given that knowledge about and experience with the NHIS and types of insurance other than the microinsurance are likely to be greater in the survey regions.

The variables that control for actual shock experiences exhibit mixed results. The number of economic shocks (that is, dramatic increase/decrease of input/output prices, inability to sell products, or loss of job) a household has experienced in the last five years has a positive effect on the microinsurance participation equation (Table 3). Counterintuitively, however, the number of death shocks a household has experienced during the past five years is negatively related to the choice of buying a policy and the extent of coverage, but the significance levels of this finding are not robust throughout all specifications (tables 3 and 4). This may indicate the negative effect of subjective risk perception, or it may be an indication that households have mainly lost productive household members and have been more vulnerable to death but are less able to afford premiums.[25]

The skepticism regarding the functioning of the product and the reliability of the insurer is confirmed by the results from the variables on the level of familiarity with the provider, integration into networks, and information channels and education. Specifically, with each additional year that a household used services from the rural bank before the Anidaso Policy was introduced, the probability that the household will participate in the insurance increases by 19 percentage points for a household at the initial population uptake probability (Table 3). For the same household, each additional social group the head is a member of increases the probability of Anidaso Policy uptake by 24 percentage points. In the context of incomplete markets and weak formal trust-building institutions – both of which impact the quality of bureaucracy, contractual security, etc. – households may rely on informal trust-building mechanisms to reduce the risk of opportunistic behavior on the part of the insurer to a much greater extent than their counterparts in conventional insurance markets. In other words, households have to rely strongly on their own and others' experience with the providing in-

25 Note that out of respect we opted not to ask households about their perceived exposure to death. In addition, accident shocks have only been experienced by a limited number of households in the past five years (6.7 percent) and the variable exhibits no significant coefficients. Therefore, the latter is not included in the specifications presented, even though it is one of the questions regarding the subjective evaluation of the risk exposure.

stitution and its staff and on insurance advice from their peer group (Giesbert and Steiner 2011; Morsink and Geurts 2011).

While education level does not seem to be relevant for the participation decision or the extent of coverage with micro life and other insurance, the dummy variable indicating whether or not the head reads the newspaper shows a significant negative coefficient for both participation and extent of coverage in the microinsurance equations. The probit results show that switching on this variable reduces the probability that a household will purchase micro life insurance by 1.5 percentage points (Table 3). The log transformed tobit model shows that whether or not the head reads the newspapers reduces the percentage of premium expenditures of total income by 7 percent (Table 4). Reading the newspapers may thus not only provide the household head with a higher level of information and awareness on financial matters (among other things) but could also (negatively) bias his/her personal impression of financial institutions, including insurance companies, depending on the focus of the reports.

As regards the additional controls, female-headed households are significantly less likely to take up micro life insurance and health insurance. Changing this variable from zero to one reduces the probability of insurance participation by 1.7 percentage points (Table 3). This finding is in line with many studies on participation in microfinancial markets and the use of microcredit and microsavings products. These studies find that despite microfinance programs' common focus on women, women generally have less access to (formal) credit (Khandker 1998; Kimuyu 1999; Diagne et al. 2000). The above finding is not in line, however, with evidence suggesting that women are more likely to spend resources in a more responsible way, for instance, on the health and educational attainment of their children (Duflo 2005), and are more likely to participate in savings schemes as an alternative way to accumulate resources for investment or to cope with shocks (Kimuyu 1999). This evidence suggests that female-headed households are also more interested in purchasing insurance for their family to cope with shocks than male-headed households. One reason for the negative effect of female headship on participation in insurance might be that operating with formal financial services is viewed as men's domain, while women resort to other (informal) strategies to deal with risk (Bortei-Doku and Aryeetey 1995). However, among those households that have purchased micro life insurance, premium expenditures indeed tend to be higher in female-headed households, as the significant positive effect of the gender variable in the tobit models and the second equation of the two-part and the selection models suggest (Table 4).

7 Conclusion

Despite the high expectations of policymakers and practitioners in microinsurance regarding the improvement of household risk management, participation in the market has remained low. At the same time, although life insurance is the most common type of microinsurance, it

is the microinsurance type that has been studied the least to date. This paper's contribution has been to analyze the determinants of participation in micro life insurance and size of coverage relative to other available types of insurance, such as health insurance, using household survey data collected in southern Ghana. The paper argues that beyond standard theoretical reasoning, there are at least two sets of nonstandard factors that are of particular relevance for micro life insurance participation. These include, on the one hand, perceived risk exposure vis-à-vis the actual experience of shocks and, on the other hand and based on a growing body of evidence in the microinsurance literature, the level of information about insurance that households possess and their level of trust in the providing institutions.

The estimation results regarding the decision to purchase micro life insurance and the degree of coverage, measured as the percentage of total household income paid for premiums, correspond to many of the benchmark predictions of standard life-insurance-consumption theories. Specifically, there is a strong indication that bequest motives outweigh any potential saving-for-retirement motives. This underlines households' recognition of the long- and short-term consequences of the death of a major breadwinner in terms of permanent losses in total household income and the immediate need for funds to cover funeral costs.

Similarly to the case for the NHIS and total insurance holdings, participation in micro life insurance is positively associated with the objective degree of risk and wealth. This relationship reverses at some point and is even negative in terms of the income spent for insurance premiums by insured households. Like one previous study that focused on micro life insurance in Sri Lanka (Arun et al. 2012), this evidence suggests that insurance providers undertake rather limited outreach to the poorest and most vulnerable households, which have the least access to other options to manage risk. This finding is underlined by the fact that there tend to be restrictions for households in the access to the rural banks' services that are associated with geographical distance and the related transaction costs. Apparently, although mobile banking via the *susu* system is widespread in Ghana, this tool has not been exploited by the insurance sales agents. Somewhat in contrast to other wealth indicators, there is a positive relationship between the experience of a loan denial and the decision to purchase a policy. However, this suggests that credit-constrained households search for alternative options to prepare against risk. A number of clients might also view the Anidaso Policy as one option to improve their reputation at the bank as an alternative to the collateral required to obtain a loan.

More remarkable results are generated when we look at the above-mentioned nonstandard determinants of participation in micro life insurance, which deserve greater attention in relation to efforts to try to expand outreach to the low-income populations.

A subjective risk perception index included in the analysis shows that – analogue to the negative effect of a simple risk-aversion dummy variable – households that perceive their exposure to risk to be greater than their peers are surprisingly less likely to participate. Interestingly, this finding does not hold in the case of the NHIS and total insurance holdings and is al-

so reversed in the case of expenditures on premiums. Here, households behave as expected: pessimists spend a higher share of their income on micro life insurance premiums. The paper argues that there are conflicting ways to interpret these findings. On the one hand, households may not be able to properly cope with the risk due to irrationality or limited understanding of the financial dimensions of the policy or the implications of the risk involved, as some of the previous literature on micro index insurance argues (Giné et al. 2008; Cole et al. 2009). On the other hand, the lower level of participation by poorer households with higher levels of perceived risk may be the result of rational choice, with the household weighing the potential gains of the insurance and the reliability of a payout against its costs, as a more recent work on micro index insurance in Ethiopia has found (Clarke and Kalani 2012).

A third argument may provide a way out of the dilemma: households operating in a context of incomplete information and limited experience with the microinsurance product and the providing institutions may rationally decide that taking up a policy is too risky an endeavor if they have only very limited funds to spend. Rather than the households being limited in their ability to understand insurance products, it may be the limited information actively provided to the target group that creates reservation among them. In line with this reasoning, participation rates are higher among those households that have been using the financial services offered by a rural bank for a longer period of time and among those that are integrated into a greater number of groups. The latter variable hints at the potentially important influence of peers as an informal trust-building mechanism in these circumstances, something which has also been highlighted by Giesbert and Steiner (2011) and Morsink and Geurts (2011). In future research it would thus be useful to more comprehensively disentangle the effects of heterogeneous subjective beliefs and risk preferences and to examine the impact of peer influence on the decision to purchase micro life insurance.

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Appendix

A1: Small Choice Experiment to Elicit Risk Aversion and Subjective Beliefs via a Proper Scoring Rule

This appendix presents the decision exercise conducted on the risk attitude of individuals using their subjective beliefs on the probability of risk. It was designed by Prof. Horst Zank, University of Manchester, School of Social Sciences, and realized by the author and Dr. Susan Steiner, DIW Berlin, in the survey underlying this paper. All descriptions below are based on the (unpublished) illustrations provided to the author by Prof. Horst Zank.

1 Set-Up

The choice experiment was part of the survey questionnaire and applied to each respondent in the sample. It involved two questions laying out the chances of an additional payment (analogue to an insurance payout) in a hypothetical future scenario indicating the possibility of becoming ill or remaining healthy. The two choices to be made were purely hypothetical and did not involve a real payout of the chosen amounts of money based on a person's health status in the next month. The following question was posed twice to the respondent, each time referring to one of the tables of payment options (below) ranging from 1 to 21 (tables A1 and A2):

"Suppose that you are offered amounts of money (again) depending on whether or not you become ill during the next month. If you become ill during the next month and cannot work for one week or more, you receive payment A; but if you do not become ill, you receive payment B. These amounts are paid to you in addition to what you already own and earn. The table below indicates possible combinations of payments A and B. (This time, the payments are different from the ones in the previous table).

[Example given and respondent asked to explain one of the options him/herself]

Please choose the option that you find is best for you. Please note that there are no right or wrong answers because your choice depends on your own preferences and circumstances."

2 Application of the Proper Scoring Rule

The measurement tool jointly estimates a person's risk attitude and his/her use of subjective beliefs on risk (the probability of becoming ill). It exploits a quadratic proper scoring rule as a truth-telling mechanism underlying the two choices made regarding both tables (tables A1 and A2).

Individuals are assumed to have subjective expected utility preferences. Simple acts of events related to monetary outcomes are denoted by P = (E_1: x_1, …, E_n: x_n). Subjective expected utility (SEU) assigns probabilities p(E_i) to the events E_i and utility u(x_i) to outcomes, such that acts can be expressed as:

$$SEU(P) = \sum_{i=1}^{n} p(E_i)u(x_i).$$

The application below refers to binary acts that pay x in the event of E and y otherwise. The SEU value of such an act would thus be SEU(p) = p(E)u(x) + [1-p(E)]u(y).

Utility is assumed to be a power function, i.e. $u(x) = x^{\alpha}$, with $\alpha > 0$. This describes the Arrow-Pratt measure of constant relative risk aversion with a coefficient of 1- α.

As outlined above, the individual is asked to choose the most preferred act of the two sets of actions presented in tables A1 and A2, which set out payments according to the following scoring rule:

A) Payment if E (illness occurs): $a*[-(1-r)^2] + b$

B) Payment if not E (no illness occurs): $a*(-r^2) + c$

Hence, the payoffs in the two scenarios are related to the probability of becoming ill (r) in the next month, with r Є [0,1]. The value for a, b, and c are fixed at the beginning of the experiment. The numbers in tables A1 and A2 hence represent amounts of money for r = 0, 0.05, 0.1, …, 0.9, 0.95, 1. The chosen option in only one of the decision rounds returns information about the individual relative risk-aversion parameter α and the individual's assessment of the probability of becoming ill in the case that α = 1 (risk neutral). The individual's preferences are then described by the subjective expected value SEV(P) = p(E)x + [1-p(E)]y, where P = (E: x, E^c: y).

However, in the case that utility is not linear, i.e. $\alpha \neq 1$, only via the second decision round on payoffs for the same events as in the first round (becoming ill/not becoming ill) it is possible to derive both the value of α and the true expected probability (r* in the first choice and r** in the second choice), thus r*/r** = p(E).

The relationship between p(E) and the given choice (outcome A and B) in Table A1 is:

$$p(E) = \frac{r*}{r* + (1-r*)\left[\frac{b - a\,(1-r*)^2}{c - a\,(r*)^2}\right]\alpha - 1}.$$

The risk-aversion parameter α can then be expressed as follows:[1]

$$\propto = 1 + \frac{\ln\left(\frac{r*}{1-r*} \cdot \frac{1-r**}{r**}\right)}{\ln\left(\frac{\frac{b-a\,(1-r*)^2}{c-a\,(r*)^2}}{\frac{b-a\,(q-r**)^2}{c-a\,(r**)^2}}\right)}.$$

The more general expression for α given the corresponding r* from the first choice and r** from the second choice is given by

$$\propto = 1 + \frac{\ln\left(\frac{r*}{1-r*} \cdot \frac{1-r**}{r**}\right)}{\ln\left(\frac{\frac{x}{y}}{\frac{x'}{y'}}\right)}.$$

Table A1: First Decision Round*

Option	**Payment A if ill** a*[-(1-r)2] + b	**Payment B if not ill** a*(-r2) + c
1 (r=0)	5.00	40.00
2 (r=0.05)	6.95	39.95
3 (r=0.10)	8.80	39.80
…	...	…
19 (r=0.90)	24.80	23.80
20 (r=0.95)	24.95	21.95
21 (r=1)	25.00	20.00

* a = 20, b = 25, c = 40

Table A2: Second Decision Round**

Option	**Payment A if ill** a*[-(1-r)²] + b	**Payment B if not ill** a*(-r²) + c
1 (r=0)	0.00	50.00
2 (r=0.05)	3.90	49.90
3 (r=0.10)	7.60	49.60
…	…	…
19 (r=0.90)	39.60	17.60
20 (r=0.95)	39.90	13.90
21 (r=1)	40.00	10.00

** a = 40, b = 40, c = 50

1 Note that α cannot be calculated in cases where one of the r-values is 0 or 1, as the natural logarithm cannot be defined. Hence, it is assumed that in the case of r = 0 and r = 1 respondents actually chose a value close to that, since in reality it is unlikely that the probability of becoming ill is truly 0 or 1. Hence, although the design of the experiment prevented this, these cases are replaced with values 0.01 and 0.99, respectively.

Table A3: Insured and Noninsured Survey Households across Survey Sites

	Number of noninsured households in sample	Number of insured households in sample	Estimated share of insured households in population (weighted, in percent)
Central Region			
Policyholder locations			
Nsaba	41	24	0.17
Duakwa	32	25	0.18
Kwanyako	44	62	0.35
Non-policyholder locations			
Mensakrom	27	0	0
Mankrom Nkwanta	27	0	0
Asafo	61	0	0
Eastern Region			
Policyholder locations			
Mamfe	28	28	0.25
Mampong	43	44	0.36
Larteh	44	36	0.29
Non-policyholder locations			
Tingkong/Nyame Bekyere	44	0	0
New Mangoase	43	0	0
Asenema	28	0	0
Volta Region			
Policyholder locations			
Sogakope	99	72	0.34
Dabala	34	30	0.15
Non-policyholder locations			
Adutor	59	0	0
Hikpo	32	0	0
Kpotame	23	0	0
Total	709	321	2.09

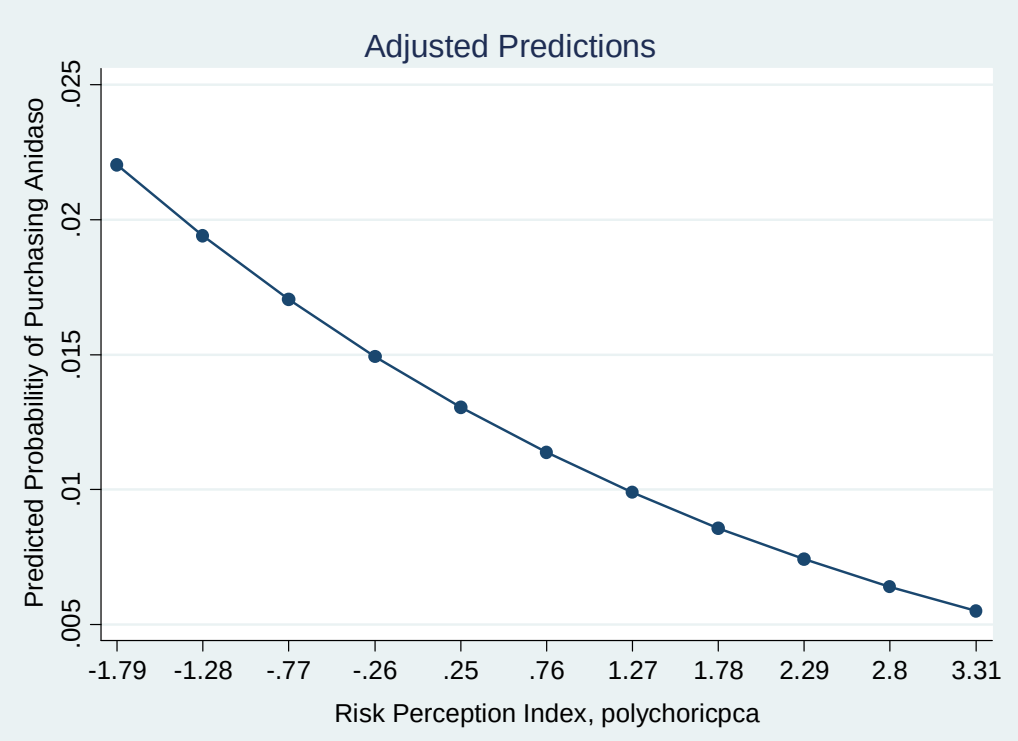
Note: Due to oversampling of insured households, the share of insured households in the respective total community population is much smaller than the relative number of these households in the sample suggests.
Source: Author's compilation based on household survey data.

Table A4: Self-Declared Reason for Buying or Not Buying Insurance

Reason	Number of house-holds	Estimated households in population (weighted. in percent)
Reason for buying the Anidaso Policy		
To secure against future shocks	180	57.58
To protect family in case of illness/death	77	23.80
For investment reasons	28	8.76
To obtain collateral for loans	17	5.13
Old-age security	5	1.47
To finance medical care	4	1.24
Other	3	1.05
To finance funeral costs	2	0.58
Education	1	0.39
Total	317	100.00
Reason for not buying any insurance		
Too expensive	145	49.62
Not important to me	40	13.29
No information on insurance facilities	29	12.95
Don't trust insurer	26	6.64
No knowledge on insurance	16	6.05
Not enough time/can't be bothered	12	4.63
Did not think about it	10	2.80
Insurance provider too far away	8	2.31
Other	2	0.75
Procedures too difficult	2	0.41
Not eligible	1	0.29
Insurance not considered effective	2	0.26
Total	293	100.00

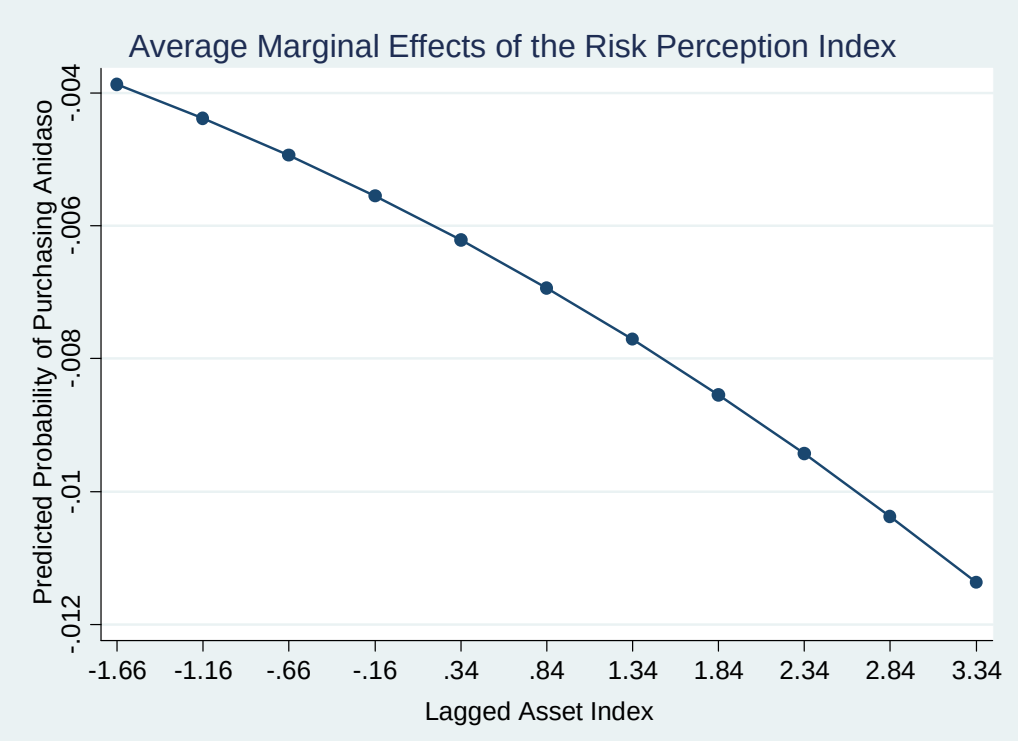
Source: Author's compilation based on household survey data.

Figure A1: Effect of the Risk Perception Index on the Probability of Purchasing Anidaso Life Insurance



Source: Author's calculation based on household survey data.

Figure A2: Effects of the Risk Perception Index on the Probability of Purchasing Anidaso Life Insurance across Values of the Asset Index



Source: Author's calculation based on household survey data.

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