DISCUSSION PAPER SERIES

DP14301

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DEVELOPMENT ECONOMICS

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This Discussion Paper is issued under the auspices of the Centre's research programmes:

- Development Economics

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Emmanuelle Auriol - emmanuelle.auriol@tse-fr.eu
Toulouse School of Economics and CEPR

Julie Lassebie - ju.lassebie@gmail.com
OECD

Amma Panin - amma.panin@gmail.com
World Bank

Eva Raiber - eva.raiber@univ-amu.fr
Aix-Marseille School of Economics

Paul Seabright - paul.seabright@tse-fr.eu
Toulouse School of Economics and CEPR

God insures those who pay? Formal insurance and religious offerings in Ghana.[*]

Emmanuelle Auriol[1,3], Julie Lassébie[1], Amma Panin[2], Eva Raiber[4], and Paul Seabright[1,3]

[1] *Toulouse School of Economics, University of Toulouse, Toulouse, France,* [2] *World Bank,* [3] *Institute for Advanced Study in Toulouse,* [4] *Aix-Marseille School of Economics*

December 31, 2019

Abstract

This paper provides experimental support for the hypothesis that insurance can be a motive for religious donations. We randomize enrollment of members of a Pentecostal church in Ghana into a commercial funeral insurance policy. Then church members allocate money between themselves and a set of religious goods in a series of dictator games with significant stakes. Members enrolled in insurance give significantly less money to their own church compared to members that only receive information about the insurance. Enrollment also reduces giving towards other spiritual goods. We set up a model exploring different channels of religiously based insurance. The implications of the model and the results from the dictator games suggest that adherents perceive the church as a source of insurance and that this insurance is derived from beliefs in an interventionist God. Survey results suggest that material insurance from the church community is also important and we hypothesize that these two insurance channels exist in parallel.

Keywords: economics of religion, informal insurance, charitable giving

JEL codes: D14, G22, O12, O17, Z12

1 Introduction

Do religious believers give money to their churches in the hope of receiving insurance against economic shocks? And if so, is this because they expect the church to look after them when shocks occur, or expect God to look after them by making such shocks less likely to happen? Many studies have emphasized the important economic functions that religious institutions fulfil across the world, of which the provision of informal insurance is one that has recently gained attention (Chen, 2010; Ager and Ciccone, 2016). Such insurance is likely to be particularly important in settings with weak formal institutions and where individuals are exposed to a variety of uninsured risks. In this paper we report a study examining the effect of providing formal market-based insurance on the demand for informal church-based insurance in Accra, Ghana.

We conduct a lab-in-the-field experiment with members of a Pentecostal church in Accra to test whether insurance is one motive behind religious participation. We do not claim it is the only or even the most important motive. We perform our experiment by randomly assigning free enrollment into a formal, commercially available funeral insurance policy and measuring how this affects willingness to contribute money in a dictator game to the church and two other charitable recipients.

The additional recipients - a secular charity and a nationwide prayer event - provide a means of differentiating between two possible mechanisms by which members might expect insurance to work. The first mechanism, consistent with a club good interpretation of church involvement, is one in which the church provides financial support to those who suffer economic hardship provided they have previously given money to the church. The second mechanism is one in which members expect God to intervene to reduce the risk of adverse economic shocks provided the individuals concerned have demonstrated spiritually meritorious actions. Giving money to a secular charity or to a nationwide prayer event might be considered meritorious actions but they do not involve a contribution to the church.

Urban Ghana is a particularly interesting setting in which to study interactions between religious participation and insurance. First of all, as we describe below, Pentecostalist churches are massively present in Ghana and many members of the population give very significant shares of their income to their church. This setting therefore allows us to examine the motives for costly participation in

activities that are also present in many other countries in the world. In our model we envisage two broad motives for participation - both the consumption of spiritual activities as such and the purchase of insurance against various shocks, and our survey evidence indicates that both of these motives matter. Secondly, in our main sample of church members we find that approximately 15% indicate that they hold any insurance other than the government run National Health Insurance. Relatively low rates of insurance mean that enrollment in a formal policy is likely to be a meaningful and significant treatment for many of our participants. Overall, therefore, our results are likely to be relevant for other settings characterized by low penetration of formal insurance and the importance of religious institutions, including different Sub-Saharan African countries but also other parts of the world such as Latin America.

We find that enrollment in the formal insurance policy causes church members to give less money to the church in a dictator game, compared to members that only receive information about the insurance. Interestingly, we find that formal insurance also causes church members to give less to the other recipients who are not directly linked to the church, but are associated with church teachings on meritorious actions.

We set up a simple model to illustrate the conditions under which we can interpret these results as evidence for insurance. In the model, a church member derives utility from secular and religious consumption. We first show that if religious consumption does not have an insurance motivation, a reduction in perceived losses (through our enrolment treatment) should increase the amount allocated to religious consumption, via an income effect. However, if religious consumption does have an insurance motivation, and if the insurance is perceived as sufficiently effective, the substitution effect of a reduction in perceived losses will outweigh the income effect and lead to a reduction in the amount allocated to religious consumption. This is what we find in our experiment.

This insurance motive can work either through a reduction in perceived losses from negative shocks because of transfers from other church members or from the church organisation, or through a reduction in perceived probabilities of adverse shocks because of belief in a divine response to religious giving. Our experiment finds evidence for the latter mechanism: church members change donations to the church as well as to the non-church recipients in a manner that is consistent with interpreting

giving as a demand for divine protection. Church members can see their donations to the church as a way to mitigate the risks they face. Provision of formal insurance decreases the need for using donations as risk-coping mechanism.

We undertook our experiment in two waves, the first in 2015 and the second in 2019. We implemented the second wave to verify the robustness of a heterogeneous treatment effect that can be explained by our model but which we had not expected to encounter in the field and which we had not pre-registered. If there are differences in the degree of religiosity, either between individuals or for a given individual over time, our model predicts that the income effect outweighs the substitution effect for sufficiently high values of the religiosity parameter. This is what we found for a subset of subjects in the first wave who had been involved in what are called "revival weeks", which are particularly intense periods of church-going and fund-raising during which congregations typically give substantially more to the church than normal. The treatment effect was of the opposite sign during revival weeks to its sign in normal weeks. This phenomenon was reproduced in a pre-registered experiment in our second wave. In a direct replication of the original experiment on participants not in revival weeks, the original effect was also reproduced.[1]

As the process of explaining to subjects the nature of the insurance in which we proposed to enrol them could increase the salience of the insured risk, our control group consisted of subjects to whom we explained the insurance but who were not enrolled. In order to assess this potential salience effect, we added a treatment in which subjects were not informed about the content of the insurance. In our first wave, the fact of explaining the insurance without enrolling the subjects resulted in a higher level of donations to the church, suggesting a significant salience impact in the opposite direction to our main treatment effect. This finding is interesting since many of the churches' communications place a heavy emphasis on the ever-present risk of death, and it could be argued that the churches are aware of this link and use it to increase overall donations. In the second wave, we did not replicate this finding; this contrasts with our insurance treatment effect, which was indeed replicated.

Although our model is an instance of standard micro-economic analysis as applied to the allocation of resources between secular and religious consumption, our empirical study is methodologically in-

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[1]The second wave experiment on revival week participants was not strictly speaking a replication since we sought to randomize allocation to revival weeks in a way that had not been done in the first wave.

novative in two main ways. First, we have provided an experimental intervention that directly affects the demand for religious insurance by providing an institutional substitute. Secondly, we have sought to distinguish carefully between different channels through which religious insurance might work - notably, through influencing the behavior of other members of the religious community as opposed to influencing the probabilities of adverse events themselves that are believed by subjects to be determined by God.

Our study experimentally links the religious practice of church giving to an insurance motive, and we find evidence that subjects believe their donations can induce God to intervene causally in the world. A Pentecostal church is a particularly good setting to test this because participation costs and expected outcomes are made explicit, and "giving to God" has a clear doctrinal mandate.

1.1   Link with the literature

The macro-economic literature, in the wake of Weber (1905), has long recognized the potential importance of culture, and especially religion, for economic growth. However, most empirical studies in this literature face a challenge in surmounting endogeneity problems, and it is generally hard to rule out the possibility that confounding factors explain both the religiosity of a population and the growth of its economy. For instance McCleary and Barro (2006a) find in their instrumental variable model that higher GDP per capita causes a reduction in average religiosity. They also find that the relationship between economic development and religiosity depends on the particular dimension of development. For example, education has different effects from those of urbanization (McCleary and Barro, 2006b). Thus, even when it is possible to estimate the magnitude of aggregate causal effects, such large-scale studies have difficulty pinpointing the mechanisms involved. Experimental methods are therefore helpful both in establishing causality and in identifying the likely mechanisms. Our paper aims at understanding a specific economic function of religious organizations: their role as informal insurers.

In examining religious organisations as insurers, our work follows that of Chen (2010), who finds that religious intensity increased with the need for ex-post insurance after financial shocks in Indonesia. Ager and Ciccone (2016) find a relationship between higher rainfall risk and religious participation and

Sinding Bentzen (2019) finds that religiosity increases if an earthquake has recently struck close-by. However, each study is compatible with a number of possible causal mechanisms, which our experiment is designed to elucidate. In particular, while the findings of Chen (2010) suggest an insurance motive for religious participation, they are also compatible with other explanations for religious participation, such as that religion provides comfort in distress after shocks strike. The findings of Ager and Ciccone (2016) and Sinding Bentzen (2019) are compatible with interpretations where other characteristics associated with rainfall or earthquake risk are also the proximate cause of religious membership (such as the amount and type of education). Our experiment allows us to allocate insurance randomly to subjects to test the insurance mechanisms more directly.

In other studies, religious participation has also been shown to provide partial insurance against fluctuations in consumption and well being (Dehejia et al., 2007). Other evidence from cross-country surveys, and historical evidence from the Great Depression demonstrate a degree of substitution between access to social welfare and religious participation (Gruber and Hungerman, 2007; Scheve and Stasavage, 2006). We add experimental evidence to this literature, causally demonstrating that access to secular insurance can reduce religious involvement. More importantly, the experimental approach allows us to test for the mechanism at hand and therefore acts as a complement to previous research done with observational data.

Our finding that spiritual insurance is an economically important reaction to risk of those who are not formally insured has important implications for the interpretation of the previously mentioned studies. Indeed, the previous literature on the interplay between religion and insurance is not able to distinguish between those two channels and might overstate the role of religious institutions as a provider of community-based financial insurance and understate the importance of a spiritual or psychological response to risk that is reflected in increased religiosity. This problem of identification is vindicated by some recent studies showing that beliefs in divine intervention in the daily lives of individuals can be an important determinant of real and costly social decisions (see Hadnes and Schumacher, 2012; Gershman, 2016; Nunn and de la Sierra, 2017).[2]

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[2]Gershman (2016) demonstrates a negative association between trust and the presence of witchcraft beliefs, while Hadnes and Schumacher (2012) experimentally find that priming vodoo beliefs increases trust and trustworthiness. Nunn and de la Sierra (2017) document the prevalence of beliefs in protective spells in South Congo, arguing that these beliefs helped village residents coordinate a stronger resistance against enemy fighters.

Our experiment contributes to the microinsurance literature by studying in a controlled environment how religious participation might affect demand for formal insurance. In recent years, microinsurance policies have been proposed and tested as poverty alleviation tools with limited success (Cole et al., 2013; Giesbert et al., 2011; Giesbert and Steiner, 2015; Karlan et al., 2014). Consistently across studies, take-up has been lower than expected and this has been attributed to a variety of factors including liquidity constraints (Cole et al., 2013), limited attention (Zwane et al., 2011), trust in the insurance mechanism (Karlan et al., 2014), and the existence of informal insurance substitutes (Mobarak and Rosenzweig, 2013). Our results suggest that religious institutions, which are an important instance of informal networks in developing countries, already provide global spiritual insurance to their members (although we do not claim that this is the only motive for church participation), and this may partly explain the puzzle of the limited success of specific formal insurance in some contexts. Since our survey results suggest that churches are also important sources of financial assistance to their members, we hypothesize that an informal, community-based material insurance exists in parallel, reducing further the need for formal insurance.

In the following section, we describe the religious context of our study. In section 3, we present the experimental design. In section 4, we use a simple model to derive our experimental hypotheses to identify an insurance effect and to distinguish between community-based insurance and spiritual insurance. In section 5, we discuss the experimental results and conclude in section 6.

2   Context

2.1   Pentecostalism

Pentecostalism represents one of the fastest-growing segments of global Christianity. Approximately one quarter of the world's two billion Christians are members of churches that can be classified as Pentecostal or Charismatic. These are related movements of Protestant Christianity that emphasize the work of a Holy Spirit and claim that spiritual gifts, such as prophecy, divine healing and speaking in tongues are expected to be present in the lives of believers (Pew Research Center, 2006). Although Pentecostal and Charismatic movements differ in some aspects, these aspects are marginal for our study, and we will use the term Pentecostal broadly. This makes sense especially in Ghana and across

Africa, where popular speech hardly draws a distinction between the two (Okyerefo, 2011; Botha, 2007).

The striking growth of this movement of global Christianity has largely taken place over the last three decades (Botha, 2007; Thelen, 2017). The speed with which Pentecostal congregations have grown is particularly remarkable as most typical definitions of the movement only date their beginnings to the early 1900s. This marked change in the composition of global Christianity has been so significant that a number of commentators refer to the Pentecostal explosion as a "new Reformation"(Thelen, 2017; Jenkins, 2011).[3] Sub-Saharan Africa has been an important centre of this change. Estimates from 2015 suggest that almost 40% of the continent's Christians identify as Pentecostal or Charismatic.[4] This reflects the wider shift in the Pentecostal revival from the Global North to the Global South. Although many early Pentecostal churches in sub-Saharan Africa were planted and funded by American missionaries, much of the dramatic growth that has taken place since the 1980s has been fuelled by indigenous developments in theology, teaching and practice. Many scholars argue that preexisting belief systems and economic conditions made sub-Saharan Africa particularly receptive to Pentecostal teachings (see for instance Ukah, 2005).

Participants in our experiment were recruited from different branches of the Assemblies of God (AoG), one of the oldest and most established Pentecostal denominations. Founded in 1914 in the United States of America, the denomination now has an international reach that covers approximately 360 000 churches in more than 250 countries (Assemblies of God World Missions, 2017). National AoG bodies are largely autonomous, but are united by some shared beliefs and a common history. Taken together, Assemblies of God fellowships form the largest Pentecostal denomination, and the sixth largest religious grouping in the world.[5] About a third of the worldwide Assemblies of God adherents are found in sub-Saharan Africa. This represents approximately 22 million adherents (Assemblies of God World Missions, 2017), about 2.5 million of whom are in Ghana.[6] In Ghana they represent just

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[3]Comparing the reformation of 16th century Europe with the "new reformation" of Pentecostal-charismatic Christianity, theologian Harvey Cox states that "today, Christianity is living through a reformation that will prove to be even more basic and more sweeping than the one that shook Europe during the sixteenth century That earlier reformationwas confined to one small corner of the globe. The current reformation, however, is an earth-circling one. The present reformation is shaking the foundations more dramatically than its sixteenth century predecessor, and its results will be more far-reaching and radical."(Cox, 2011)

[4]Todd M. Johnson and Gina A. Zurlo, eds. World Christian Database (Leiden/Boston: Brill, 2007). http://worldchristiandatabase.org

[5]www.adherents.com

[6]Todd M. Johnson and Gina A. Zurlo, eds. World Christian Database (Leiden/Boston: Brill, 2007).

under 10% of the national population, attracting members from all social strata.

Many of these teachings that have taken root and been developed in sub-Saharan churches are shared by Pentecostal believers across the world in the transnational exchange of ideas and resources that characterises Pentecostalism today (Gifford, 2004; Kalu, 2008). There is, of course, considerable heterogeneity in beliefs and practices within individuals in a given church, across branches within a single denomination, and across denominations of the broader Pentecostal movement. However, the key features of Pentecostal belief and practice, which are important for the interpretation of our study design, are widely shared. By focusing recruitment from a popular and established denomination, we are able to draw out insights that should be applicable to this large and growing movement, and to other religious practices that share certain features of these beliefs.

2.2   The role of the church in Pentecostalism

In terms of practice, the church is an essential part of life for Pentecostal adherents. They go to church more regularly than other Christians and perform other religious practices more frequently. For example, compared to the general population, Pentecostals pray and read the Bible more often, and more frequently watch or listen to religious programs on television and radio. They are also more likely to share their beliefs with others to spread their faith (Pew Research Center, 2006).

Members also enjoy non-spiritual benefits from their church. An essential function of Pentecostal churches in Ghana, in particular in urban areas, is to offer a place for social gathering. Tables 7 and 8 in Appendix A show descriptive statistics of selected answers from our study questionnaire about the social and financial role of churches. For instance, 40% of our study participants declare that they have found their spouse (or are most likely to find their future spouse if not already married) in church. This does not mean that for them, church is just or even mainly a place to meet potential marriage partners. On the contrary, precisely its appeal in this dimension consists in providing access to marriage partners who are there for other, at least partly, spiritual or ethical motives.

Some church members even report that they favor other church members as business partners

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http://worldchristiandatabase.org

(39% of respondents in our study, Table 8 in Appendix A). More fundamentally, people seem to be attracted to such churches because they feel part of a broader community which looks after them, be it through other church members, church leaders, or God. When faced with any personal or family problems, 48% would go to either their church community or the church leadership while 45% would ask another church member for help (Table 7 in Appendix A). This is consistent with survey evidence from the Afrobarometer and the World Values Survey showing that across Africa, religious leaders are considered amongst the most trustworthy members of civil society. They are expected to take responsibility for their members' welfare in the absence of government-led social interventions and urbanization enhances these expectations (McCauley, 2013).

Pentecostal adherents are expected to support their church financially. Giving is often multi-layered and different ways of transferring money might have different motivations. *Tithing*, the practice of giving away a tenth of all income, usually takes the form of a non-anonymous monthly payment to the church for which church members receive a receipt. This type of giving is akin to a membership fee to the church community. On the other hand, there is giving for specific purposes such as *pledges*, which are occasional non-anonymous donations involving large amounts of money, often for investment in church infrastructure. Finally, there are *spontaneous offerings*, made on a more regular basis, which are generally anonymous and the amounts given unobserved (though during collections in Sunday services the fact of going forward to give may be very visible to a member's friends and family). Opportunities for this form of giving are frequent and contributions are expected beyond the other regular or earmarked forms of giving. This includes among others *seed offerings* - the practice of giving money in anticipation of a future material benefit, or *thanksgivings* in gratitude for already materialized benefits (Maxwell, 1998; Gifford, 2004). The type of giving we observe in our experiment falls into this category of spontaneous giving.

2.3 Giving to God to access insurance

Giving to the church might interact with the use of the church as an insurer in a number of ways. Firstly, individuals might give to the church in expectation that the church as an institution would reward this sign of commitment by disbursing funds in times of need. Secondly, individuals might use their public giving to send signals that they are good community members to other church members,

and expect that other church members then contribute to help them in times of need. The costs of religious participation can be seen as screening mechanisms to ensure that members are reliable and to prevent free-riding (Iannaccone, 1992). Additionally, the community structure of the group with repeated interactions reduces monitoring costs (Berman, 2000). These two types of community-based insurance could be considered "material" insurance.

In addition to its role as a social network, the church is also believed by its members to be a setting for encounters with the divine. The church therefore has a value as an insurer because it facilitates access to an interventionist god who can prevent negative shocks and favor positive ones. We call this type of insurance "spiritual" insurance. This form of insurance is interesting because it does not rely solely on giving to the church but on "giving to God", which can be interpreted as undertaking projects that will be blessed by God, or "sowing on any fertile ground" (Gifford, 2004). This expansive interpretation of "giving to God" allows us to extend our experimental design to investigate how participants react to giving to recipients which are separate from the church, but which still fulfil the spiritual mandate. This allows us to make some distinctions about the different types of insurance experienced in the church. These mechanisms are formalised in the model in Section 4 of the paper, and the doctrinal features are discussed here.

The first and most prominent feature is the forthright relationship between giving to God and material well-being. Pentecostal preachers across Africa speak of a God who does not want His people to be poor or to suffer.[7] This mandate is often described as a variant of the "Prosperity Gospel", the set of teachings that say that "Christianity has to do with success, wealth, and status" (Gifford, 2004).[8] And in contrast to other Christian groups where rewards are generally given out in the after life, it is usually pointed out that the expected time frame of miracles is short and immediate.[9] The immediacy of the miraculous work is reflected in the structure of many church services that are themed

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[7]Enoch Adeboye, head of the Lagos-based international Pentecostal megachurch Redeemed Christian Church of God, teaches, "God is not poor at all by any standard...the closest friends of God [in the Bible] were wealthy people... Poverty is a curse and prosperity is not evil" (Ukah, 2005, pg 260). Similarly (Gifford, 2004) pg 50 cites a pastor proclaiming "God is in the business of addition and multiplications; Satan is in the business of substraction and division."

[8]While the term "Prosperity gospel" has typically been used to describe teachings from some Evangelical churches in North America, some scholars of African Pentecostal theologies argue that the "African prosperity gospel" is more nuanced, certain aspects of it "are borrowed from external sources; others are home-grown. Still others are derived from external sources and adapted to fit local contexts" (Kalu, 2008)

[9]Some declarations made during a church service include: "Before the year comes to an end, there are people here who will be counting millions of dollars in their accounts...", "This month, no accident sickness, stagnation will affect you" or "Marriages dont collapse here, businesses dont collapse here, nobody fails here" (Gifford, 2004) Pg 50 and 58)

around the material successes of its members proclaimed in lively testimonies.[10] Pastors emphasize how behaving in a manner that unlocks God's blessing helps to avoid the risks that get in the way of achieving these successes. Their preaching makes a particularly strong and explicit link between giving to God and insurance. For example, an excerpt from a sermon preached in Ghana states: "The Lord will remember your offering; it is comprehensive assurance" (Gifford, 2004, Pg 46).[11] And unlocking God's blessings is invariably achieved by "doing something special that will move God and cause him to bless you more than you intended" i.e. giving money, preferably to the church (Ukah, 2005).

3   Experiment

We conducted an experiment in Accra, Ghana in two stages. The first wave was run in November and December 2015 with 576 participants. The main hypotheses that were pre-registered and tested were the average differences between the treatment groups.

We ran the second wave in May and June 2019[12] with 494 participants because a subset of wave 1 participants attended the sessions during weeks in which their churches were hosting large revival events. This inadvertently violated our experiment protocol, under which sessions were held on weekdays to avoid conducting experiments with subjects who had been in church on the same day. However, revival week events are conducted all through the work week. We had not pre-registered the exclusion of revival participants (or any church member visiting the church on the same day), and indeed their results yielded interesting insights consistent with our model. The second wave was an opportunity to pre-specify and test a hypothesis about revival week attendance. We used an encouragement design to randomly assign some wave 2 participants to attend sessions during a revival week. We also use wave 2 to conduct a direct replication of our original experiment with non-revival participants to verify if the results are robust to inevitable changes in the environment (such as a different part of the city, different socio-economic characteristics, inflation etc).[13] The resulting increased sample size allows

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[10]Gifford cites some testimony themes that include the following: "I am a millionaire today!", "Jobs started coming in!", "My own choice car!", "Now they pay me in dollars!", "A Baby, Two Cars, and Promotion".

[11]Other examples include: 'The preacher asked the congregation if they were putting aside for a rainy day, but promised: If you give, you wont have a rainy day" (Gifford, 2004, Pg 50). "Every part of your destiny is assured by God, insured by God" (Gifford, 2004, Pg58).

[12]With encouragement from a referee and the editor, to whom we are grateful.

[13]Between 2015 and 2019, Ghana experienced year-on-year inflation rates of 17.45, 12.37, 9.39 and 9.50 respectively

higher precision and facilitates exploratory heterogeneity analysis.

Randomisation was done at the session level. At the start of each session, one participant per group was invited to pick one out of three unmarked envelopes. Participants were told that the envelopes contained a piece of paper that would determine the type of session they would play. This information was shared with participants to prevent incorrect guesses about the different possibilities and to avoid that participants who heard from other about the insurance believed that they would receive it in the end. The pieces of paper were labelled "Insurance", which corresponded to our insurance enrolment treatment; "Insurance information", which corresponded to the control, and "No insurance", which corresponded to the no insurance information treatment (i.e., groups who were not enrolled in the policy and did not have any sort of discussion about insurance). The insurance was a funeral insurance policy offered by a leading micro-insurer active in the Ghanaian market. The outcomes we measured were allocations out of an endowment (which subjects were free to keep, all or in part) towards a participant's church and two other non-church recipients.

3.1 Enrollment treatment: Funeral insurance policy

Funerals are large and costly events in many sub-Saharan African societies (Berg, 2016; Case et al., 2013). Surviving family members are expected to honor the dead through lavish commemorations. The rising toll of funeral costs has received attention from media, academics and political leaders.[14] More recently private financial service providers have begun to offer savings and insurance products designed specifically to meet these costs.

In Ghana, guests and other members of the bereaved's community typically make contributions that help to cover the funeral costs. It is important to note that community support is not only financial - churches also organise provision of food and moral and logistical support, so any formal

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(see https://data.worldbank.org/indicator). Prices and purchasing power changed over this period, including the premium and payouts of the insurance. We adjust endowments and show-up fees of the experiment accordingly. However, due to rounding and pricing decisions of the insurance company, amongst other changes, the amounts used in wave 2 prevent this from being an exact replication.

[14]See for instance "The long goodbye: Why funerals are big deals in Ghana" By Paula Newton available at http://edition.cnn.com/2014/03/11/world/africa/on-the-road-ghana-funerals/index.html and "Bankruptcy and burials: Can Ghanaians afford such splendid funerals?" The Economist 2007 available at http://www.economist.com/node/9234475, and also "Death around the world: Funerals and fantasy coffins in Ghana" available at https://www.funeralzone.co.uk/blog/death-around-the-world-funerals-in-ghana

insurance product will only be addressing a single aspect of the church contributions. The degree of formalisation of this type of support varies across the churches in our sample. In interviews with church leaders, most confirmed that observed commitment from members was a prerequisite for church involvement in their funerals. Definitions of commitment always included attendance of church events and financial commitment to the church in terms of tithes and offerings.

We offered participants a micro-insurance policy available on the Ghanaian market. The policy offered individual enrollment into a group policy. Pastors of each church branch acted as the coordinators of the policies. This meant that the insurance company would channel any group communications (e.g. new tarifs) through the pastor, but all financial and administrative aspects of the policy rested with the company. The policy covered the life of the participant and a member of his or her immediate family. If either of these parties were to pass away within a year, the policy would pay GHS 1000 ($265 in 2015; the payout was kept at GHS 1000 in 2019 which because of the inflation was worth roughly GHS 630 in 2015) to the surviving family members. This policy cost GHS 12.5 ($3USD in 2015; GHS 20 in 2019) for two family members per year.[15] Individuals in this treatment were enrolled on the spot after completing a demographic survey and before playing the dictator game.

3.2 Control group and no insurance information treatment

During pre-tests it became clear that discussions of death and planning around death would be sensitive topics. Reluctance to contemplate large unpleasant risks has been raised in the literature, particularly in other developing country settings where people are severely limited in the steps they can take to address these risks (Case et al., 2013). Furthermore, findings in psychological research show that awareness of mortality can modify Christians' religiosity and beliefs in a supernatural entity (see for instance Jong et al., 2012; Norenzayan and Hansen, 2006). As the insurance treatment was designed to isolate the effect of being *enrolled* in insurance, we offered the same information about the insurance policy to the control group, so that the same issues of death would be salient in both settings.

In order to see whether the greater salience of the risk of death that results from discussion of insurance was in itself affecting subjects' willingness to donate, we added a second treatment where

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[15]One main goal of the group micro-insurance is to have a simplified scheme and low coordination costs. This implied that the tariff was independent of the gender, age or other characteristic of the insured. The main insurance taker only had to be above the age of 18 and below the age of 75 who could then insure his/her children and other close family members under the age of 75.

people were not informed about the content of the insurance policy. Comparisons between this group that did not discuss death and the control group that received insurance information allow us to see how church members react to an increase of perceived risk in the absence of formal insurance.

3.3   Recruitment

We recruited 1070 (576 in wave 1 and 494 in wave 2) study participants from sixteen different church branches within one particular denomination.[16]   We approached these churches using a snowball sampling strategy.   Participants were informed of the experiment through announcements made on Sunday mornings during regular church services. To avoid confounds with normal Sunday offering, all sessions took place during the subsequent work week in a neutral location. In wave 1, a subset of 122 participants were inadvertently recruited during "revival weeks" when their churches were engaged in active fundraising services during the work week. We found interesting results for this subset. In the second wave, we therefore purposely sampled and randomized experiment participation during revival and standard church weeks. The results for this subset of subjects are discussed after presenting the main experimental results, which involve 849 participants in the two waves.[17]

3.4   Experimental Setup and Design

It was very important for the credibility of our study that, with the exception of recruitment, all interactions with participants took place off church premises and that participants were assured of anonymity so as to avoid any contamination of the results by perceived pressure from the church authorities. This involved a substantial effort to transport the recruited individuals to a study location

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[16]For five of these sixteen churches, fewer than 30 members participated in our experiment. In analysis, we group all participants from these churches into one of two categories called Other church wave 1 and Other church wave 2". We were able to conduct extended interviews with pastors from ten of the sixteen branches to learn more about the structure of their services, membership, and other church events. This information is summarized in Tables 9 and 10 in the Appendix.   The branches are heterogeneous in terms of age, size, members characteristics, and geographical locations in the city. They represent the great diversity of Assemblies of God branches that can be found in Accra.

[17]We were also interested in seeing how our hypothesised mechanisms operate within a secular organisation, so we recruited an additional 242 market sellers. Traders in this market are organized into an association that could provide financial assistance such as credit or insurance to dues-paying members. During the first round of data collection, we realized that the insurance treatment was not properly implemented in this sample as it was with the group of church members. Indeed, the funeral insurance was coordinated by the head of the market association. Informal discussions with study participants as well as their answers to survey questions warned us that trust in the insurance coordinator might be low. It therefore seemed likely to us that participants would not trust that the insurance would be actually implemented, thus discrediting the insurance treatment. Furthermore, questionnaire answers informed us that the market association is not a commonly-used risk sharing structure, and is by no means similar to the church community in that respect. We therefore stopped collecting data on market members after the first round of the study and the sample for this group is too small to be able to detect treatment effects. Results from this smaller additional sample are available from the authors on request.

at some distance from the church, as well as the setting up of a proper lab-in the-field with laptops and room dividers between subjects so as to make the assurance of anonymity credible. All participants were compensated for transport to the neutral locations.

Interested participants were assigned to sessions. 77% of participants were in sessions of 6 - 12 people. The remaining sessions that were smaller or larger than this range occurred randomly across treatments, dates, churches, revival and non-revival weeks.[18] A session consisted of randomisation as described above, an extended survey where each participant was interviewed by an enumerator who spoke the participant's local language, a set of dictator game decisions and private payment.[19]

Table 1: Pairs of dictator game recipients.

A	Self	Church (anonymous)
B	Self	Street children
C	Self	Thanksgiving
D	Self	Church (non-anonymous)
E	Church (anonymous)	Street children
F	Church (anonymous)	Thanksgiving
G	Church (anonymous)	Church (non-anonymous)
H	Street children	Thanksgiving
I	Street children	Church (non-anonymous)
J	Thanksgiving	Church (non-anonymous)

Participants privately played 10 dictator games. Each game asked participants to allocate GHS 11 between two recipients (GHS 19 in 2019 to adjust for changes in purchasing power; both amounts represent a little less than average daily income). The set of recipients consisted of the participant's church, a secular charity, a national prayer organisation, and the possibility of keeping the money. There were also two ways in which individuals would give to the church: the first being an anonymous donation, the second being a named donation. The pairs of recipients are listed in Table 1. The order of the 10 dictator games was randomized by the computer program.[20]

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[18]Sessions with fewer than 4 individuals were excluded as per our pre-analysis plan.

[19]The survey was done before the game. First, this had a logistical motivation as the survey was done with the enumerators who subsequently explained the game and then left so participants could play privately. Second, the survey was the component that we focused on most during recruitment and cooperation with the churches. This was done to avoid subjects feeling like they were "playing games".

[20]Regarding anynonymous and non-anonymous donations, one concern is that participants that see named donations before anonymous choices may think about the latter in a different way. We randomize the order of the dictator games precisely to address this type of concern. However, we also checked whether seeing named donations before anonymous ones affect later choices to give to church anonymously and we find that this is not the case.

The Street Children's Fund is a charity that takes care of the education needs of homeless and vulnerable children. The charity operates in a district of the city that is geographically and culturally distinct from the ones where we recruited participants. Giving to this charity could largely be understood as an altruistic action. The thanksgiving offering is part of an annual inter-faith prayer event. Leaders and members of various faiths join together in prayer for Ghana. Giving towards this event was meant to be interpreted as giving towards a largely spiritual interest. Pre-tests and focus groups during piloting confirmed that study participants would indeed see these two recipients of their donations in this manner.

Participants were paid a flat show-up fee of GHS 20 in 2015 (GHS 30 in 2019). After all decisions had been made in the dictator games, one game was selected at random individually for each participant, and further payments were made according to the decision taken for that game. This meant that participants had the opportunity to earn up to GHS 31 (GHS 49 in 2019). Average overall earnings from the experiment were GHS 22.50 (GHS 38.00 in 2019) which were paid privately to participants.

The experiment protocol and the questionnaire can be found in the appendix. This experiment was pre-registered in the AEA registry.[21] The second wave was pre-registered with a detailed pre-analysis plan. There were two deviations from the protocol in wave 1. First, we stopped the experiment with a market sample because the sellers did not trust their market leaders, which made it impossible to implement the insurance treatment. Second, we did not anticipate the revival weeks therefore we did not pre-register that we would exclude revival participants or analyse their effects separately.

Wave 2 allowed us to address the revival week concern by running a new experiment. There were three unavoidable changes to the main protocol between wave 1 and wave 2. First, we adjusted outcomes in 2019 for inflation, which meant that participants faced GHS 19 instead of GHS 11 allocation choices. Second, the insurance company maintained the payout at GHS 1000 despite adjusting the premium for inflation. This meant that wave 2 participants were treated with a smaller dose than wave 1 participants. Finally, due to the timing of field work, the national thanksgiving offering was 1 month in the future during wave 1, while it had just taken place during wave 2. This implies that the next national thanksgiving event we asked our subjects to contribute to was going to be in one year.

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[21] AEA RCT Registry ID: AEARCTR-0000558 for the first wave and AEARCTR-0003989 for the second wave

This likely affected its perception as a relevant spiritual good.

Table 11 in Appendix A shows the numbers of subjects by wave and by treatment.

4   Model

We develop a simple model to formalize the types of behaviour we expect our experiment to capture, and use results from the model to motivate the experimental hypotheses. First we establish how church members who derive utility from secular as well as spiritual consumption would behave given the risk of an exogenous income shock in a bad state of the world, if there is no insurance offered by the church. We then consider two church-based insurance channels. Community-based insurance is modelled as a payment given to a church member in the case of a loss where the size of the payment depends on how much the church member gives to their own church. Spiritual insurance is modelled as a belief that the subjective probability of a loss is reduced by giving to the church and other goods used for religious signalling, such as the spiritual and secular charities.

The mechanisms of our experiment are captured in the model as changes to the size of the loss. The insurance scheme into which we enrolled individuals paid out in the event of their own death or the death of a relative. The loss we model is a financial loss and is not intended to cover all of the aspects of the distress suffered by an individual facing the death of a loved one, let alone the adverse emotional and other consequences to them of their own death. As in any life insurance decision, the individual does not expect to be compensated for their own death, but intends rather to offset in part the financial consequences of a death to those still left alive. Individuals are capable of anticipating the benefit of that payout and considering it as a (possibly vicarious) benefit in anticipation of which they are willing to pay a premium, even if they do not expect to be alive when the payout occurs.

There are two ways in which our insurance treatments may affect the size of the loss. The first is when insurance information is provided to participants. The process necessitates a discussion about death both of the participating individual and his or her loved ones. This discussion brings home to participants the reality of a risk they had perhaps been inclined not to think about, and thereby makes

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death more salient. We represent this as an increase in the perceived size of the loss, compared to the situation before they had received this information. However, this interpretation of the provision of information is necessarily tentative; we return to the question in discussing the results below.

The second way in which our insurance treatment affects the size of the loss is when individuals are actually enrolled. We represent this as a reduction in the perceived size of the loss.

We show how in the presence of an insurance motive in the church, the main insurance treatment can lead to a decrease in giving, and the provision of only insurance information can lead to an increase in giving.

4.1 Setup

We assume that a church member has an income of Y and chooses to give an amount g to the church. The church member enjoys utility $u(Y - g)$ from consuming $Y - g \geq 0$ secular goods, and utility $\theta f(g)$ from contributing $g \geq 0$ to church goods. Thus a church member who gives g to the church enjoys a total utility of $u(Y - g) + \theta f(g)$. The parameter θ reflects the relative weight the individual puts on church activities compared to secular consumption. This weight might differ from one individual to the next (there may be individual heterogeneity). More importantly for our empirical analysis it might also differ in time (for instance, in revival weeks individuals go to church every day and are focused on spiritual activities). Both utility functions u and f are increasing and concave in their arguments. We therefore make the assumption that religious consumption is a normal good.[22]

In each period, church members face a probability π of an income loss of size D. Under the assumption that insurance is offered through the church, giving an amount g also has the impact of reducing the size of the loss by an amount $l(g)$, thus the total loss would be $D - l(g)$. Under the assumption that church members believe in spiritual insurance, the probability of a loss is decomposed into a basic probability of loss $\tilde{\pi}$, and a reduction in the probability of loss that can be mitigated by giving money to spiritual goods. Therefore, the total subjective probability of loss is $\pi = \tilde{\pi} - p(g)$.

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[22]This assumption contradicts the secularization hypothesis that higher income leads to lower religiosity. However, it is in line with new studies using panel or micro data (Becker and Woessmann, 2013) and (Buser, 2015). A theoretical rationale for the positive association of income on religious consumption can be found in club good models of religion (Iannaccone, 1992; Berman, 2000; Berman and Laitin, 2008).

The following subsections set-up the maximization problems and show how optimal giving varies with the perceived size of loss. We assume that church members choose a particular level of giving g to maximize their total expected utility. All proofs are in the appendix.

4.2 Optimal giving to the church in the absence of any insurance

In this section there is no insurance offered through the church. We label this Hypothesis H0. The optimization is:

$$\max_{g} \quad (1-\pi)u(Y-g) + \pi u(Y-g-D) + \theta f(g) \tag{1}$$

Solving for the first order conditions and taking optimal giving g^* as a function of D allows us to show that giving is decreasing with the size of the loss D:

$$\frac{\partial g^*}{\partial D} < 0 \tag{2}$$

This classical result of consumption smoothing comes from the standard concavity assumptions of the utilities derived from secular and religious consumption. When faced with an increase in the potential loss D, church members shift spending from religious consumption to secular consumption to ensure a higher level of secular consumption in case of loss. We call this result the "income effect".

Therefore, this subsection predicts that if there is no insurance mechanism in the church (neither community-based, nor spiritual), the information about the funeral policy in the control group, by increasing the perceived loss D, would lead individuals to decrease church giving g^*. We summarize this empirical prediction of Hypothesis H0 in the form of:

Empirical prediction H0a: Compared to no information, insurance information decreases giving to the church.

Correspondingly, compared to the control group, the enrolment treatment reduces the perceived risk of loss, thereby decreasing D, and thus would increase giving to the church. The second empirical prediction of Hypothesis H0 is therefore:

Empirical prediction H0b: Compared to insurance information, insurance enrollment increases giving to the church.

4.3 Community insurance: optimal giving when giving reduces the size of a loss

In this section we assume that the church community provides material insurance such that church giving reduces the size of the loss. We call this Hypothesis H1, and we write $L = D - l(g)$, where l is an increasing and concave function with $l(0) = 0$ and $l'(0) > 1$ (this last condition means that the community insurance in the bad state more than offsets the amount previously donated by the individual). In this case, church giving can be seen as payment of the premium of an informal insurance that covers part of the possible loss. As it is offered by the church community, only giving to the church - and not giving to other religious goods - provides access to this type of insurance. The utility maximization problem is as follows:

$$\max_g \quad (1 - \pi)u(Y - g) + \pi u(Y - g - D + l(g)) + \theta f(g) \tag{3}$$

We solve for the first order conditions and express optimal giving g^* as a function of the loss D. We find that:

$$\frac{\partial g^*}{\partial D} > 0 \Leftrightarrow l'(g^*) > 1 \tag{4}$$

When there is an insurance motive behind church donations, an increase in the potential loss D triggers two opposite effects: the substitution effect, whereby church members try to mitigate the increase in loss by buying more informal insurance; and the income effect, described in the section 4.2 where church members reduce giving to the church to have more money available for secular consumption smoothing.

Condition (4) shows that as long as community-based insurance is effective enough in decreasing the loss, which is the case for low enough g^*, the consumption-smoothing effect from the baseline model (income effect) is outweighed by the increased demand for church insurance (substitution effect). Therefore, the overall effect of an increase in D is an increase in the optimal giving.

This subsection therefore predicts that if there exists an effective community insurance that reduces the size of a loss in case of a shock, the information about insurance should increase church giving (compared to no insurance information) while the enrolment treatment would decrease church giving (compared to the control group). These effects are the *opposite* of the predicted effects discussed in the previous section, when there is no insurance motive for giving to the church. There should be no impact of either treatment on giving to other recipients. The three empirical predictions of Hypothesis H1 are therefore:

Empirical prediction H1a: Compared to no information, insurance information increases giving to the church.

Empirical prediction H1b: Compared to insurance information, insurance enrollment decreases giving to the church.

Empirical prediction H1c: There is no effect of either insurance information or enrolment on giving to the other recipients (the thanksgiving offering and the street children's fund).

4.4 Spiritual insurance: optimal giving when giving reduces the subjective probability of a loss

In this section we assume that there is a spiritual insurance motive such that giving reduces the subjective probability of the loss $\pi = \tilde{\pi} - p(g)$. It is important to stress that giving can be to the church or to any other charitable/spiritual organizations that can be used for religious signalling. The mechanism here works through God: being a good Christian reduces the subjective probability of a negative shock. We call this Hypothesis H2. Utility can now be written as:

$$\max_g \quad (1 - \tilde{\pi} + p(g))u(Y - g) + (\tilde{\pi} - p(g))u(Y - g - D) + \theta f(g) \tag{5}$$

We can show that:

$$\frac{\partial g^*}{\partial D} > 0 \Leftrightarrow p'(g^*)u'(Y - g * -D) > (\tilde{\pi} - p(g^*))u''(Y - g^* - D) \tag{6}$$

This condition is harder to interpret intuitively in the non-parametrized form, and for the second order condition to hold requires that the second derivative of the utility function not increase too fast in the

size of the loss, which means that the income effect must not be large. So we defer the discussion to the appendix where we investigate it using a CARA utility function. In short, we find that the optimal giving g^* is increasing in the size of loss D when the spiritual insurance is effective enough. Indeed, when this is the case, individuals prefer to invest in decreasing the subjective probability of loss by increasing their religious giving rather than smoothing consumption (in other words, the substitution effect of the loss dominates the income effect).

Therefore, this subsection predicts that providing participants with insurance information would increase giving to any charitable or spiritual organization (compared to no insurance information) while enrolling them in the insurance treatment would decrease giving to any charitable or spiritual organization (compared to the information treatment). The three empirical predictions of Hypothesis H2 are therefore:

Empirical prediction H2a: Compared to no information, insurance information increases giving to the church.
Empirical prediction H2b: Compared to insurance information, insurance enrollment decreases giving to the church.
Empirical prediction H2c: The effects on giving to the thanksgiving offering or the street children's fund are similar to the effects on giving to the church.

4.5   Experimental hypotheses

We collect here all the empirical predictions of the three different insurance hypothesis so they can be compared and tested against one another.

H0 There is no insurance provided through the church (section 4.2).

  H0a Compared to no information, insurance information decreases giving to the church.

  H0b Compared to insurance information, insurance enrollment increases giving to the church.

H1 *Community* insurance is provided through the church (section 4.3).

H1a Compared to no information, insurance information increases giving to the church.

H1b Compared to insurance information, insurance enrollment decreases giving to the church.

H1c There is no effect on giving to the thanksgiving offering or the street children's fund.

H2 *Spiritual* insurance is provided through God (section 4.4).

H2a Compared to no information, insurance information increases giving to the church.

H2b Compared to insurance information, insurance enrollment decreases giving to the church.

H2c The effects on giving to the thanksgiving offering or the street children's fund are similar to the effects on giving to the church.

Our experimental design allows us to test for an insurance mechanism in giving (test for H0a against H1a/H2a and H0b against H1b/H2b) and then test the two insurance channels of spiritual and community-based insurance against each other (H1c against H2c). Spiritual insurance effects should be similar across recipients. However they might be different in magnitude since, for instance, church members could see church donations as the most effective tool to decrease the probability of a loss.

Our model and experimental design do not allow us to make a clear prediction of the result if we compared the group that received no insurance information to the group that received insurance. This is because, as described in the model setup, the insurance treatment is composed of both the actual insurance effect which we are interested in and a salience effect. The model demonstrates how these two effects work in opposing directions. While we are unable to formulate an ex-ante hypothesis about the overall comparison between receiving insurance and not receiving any information, we discuss the results in section 5.3.3, where we suggest some interpretations about the relative magnitudes we observe and discuss what they might further tell us about the potential mechanisms of church-based insurance.

Finally, our experiment allows us to test for the average behavior within the church. This average potentially captures heterogeneity in different parameters: Church members can vary in how much they value donations to the church relative to secular consumption (variation in θ) and if they see a insurance motive in their donations (if g enters in the probability function or the payoff function). In sections 5.5.2 and 5.5.3 we discuss potential heterogeneity in the average treatment effect.

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5   Experimental Results

5.1   Descriptive statistics

Our main results include 849 church members recruited during regular service weeks from sixteen[23] different church branches; we have complete socio-demographic information for 804 of these.[24] Table 2 summarises pre-registered variables of these participants. The groups were balanced across treatments for all key variables except gender (women tend to be over-represented in the insurance information and no insurance groups). An F-test cannot reject the null hypothesis that these main demographic variables do not jointly explain assignment to any of the treatments. In further tables, we report results of regressions with and without control variables for individuals' demographics (gender, age, education, income, employment status, ethnicity) and measures of religious behavior (church attendance and prayer frequency) as well as church fixed effects. The treatment effects remain similar, with respect to both magnitude and statistical significance.

Table 12 in Appendix A presents a summary of some demographic variables that were not pre-registered. These are not included as controls in any regressions. Thirty-three percent (85% in wave 2) had registered for the National Health Insurance scheme and only 18% (10% in wave 2) held any other sort of insurance prior to participating in the study. None of the participants in wave 1 had spent their whole lives in their current church; 44% of wave 2 participants had done so.

Compared to the national population, our participants had lower incomes and were less likely to be employed (Table 13 in Appendix A). We believe that this selection is not a threat to external validity: we are interested in the attitudes towards insurance in precisely this significant subgroup of the general population who are likely to be particularly vulnerable and face a greater number of formally uninsured risks. Wave 2 participants differ from wave 1 participants across some key demographic variables (right-hand column of Table 13). We believe this reinforces the validity of our results across groups that differ demographically but nevertheless share religious practices.

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[23]Churches with fewer than 30 participants in our study are grouped in an "other church" category for analysis.

[24]The questionnaire software malfunctioned during the first few sessions, so some survey data were not saved. There were no problems with data from the dictator games.

Table 2: Pre-registed covariates compared across treatments.

				Differences(p-value)	
Variable	Insurance	Insurance information	No insurance	Insurance - info	Info - no
Age	36.90	37.69	36.68	0.79(0.45)	−1.01(0.33)
Female	0.64	0.65	0.71	0.01(0.77)	0.06(0.09)
Monthly income, GHS	312.09	310.63	302.94	−1.46(0.95)	−7.69(0.72)
Employed	0.62	0.58	0.63	−0.03(0.35)	0.05(0.18)
More than secondary school	0.22	0.23	0.21	0.01(0.66)	−0.02(0.49)
Akan ethnicity	0.34	0.31	0.30	−0.02(0.50)	−0.01(0.74)
Ewe ethnicity	0.20	0.25	0.17	0.05(0.10)	−0.08(0.01)
Ga ethnicity	0.13	0.10	0.16	−0.03(0.16)	0.06(0.02)
Attends church daily	0.05	0.05	0.05	0.00(0.93)	0.00(0.97)
Prays multiple times per day	0.87	0.90	0.85	0.02(0.35)	−0.04(0.10)
Attended during revival week	0.21	0.27	0.15	0.07(0.04)	−0.13(0.00)
Wave 2	0.46	0.48	0.44	0.01(0.71)	−0.03(0.36)
F-tests for joint significance					
F-stat				0.35	1.73
P-value				0.97	0.07

Summary of covariates across treatments, pooled sample.

Note P-values reported in parentheses are from a t-test of equality of means.

5.2 Summary of the allocation decisions

In this subsection and the following we focus on the three dictator games among the ten played where anonymous donations to the three recipients were paired with the possibility to keep the money. Results from the other games are discussed in subsection 5.5. The histograms in Figure 1 plot the distributions of giving to the three different recipients. On average, participants chose to keep 51% of their endowment (5.64 GHS in wave 1 and 9.75 GHS in wave 2) and give away 49% of the endowment.

44% of participants selected an allocation close to the equal split of either 5 GHS or 6 GHS in wave 1 (9 GHS or 10 GHS in wave 2). Across recipients, roughly 5% of participants gave nothing, and 6% of participants gave everything away. These spikes at the extreme values highlight that allocations to the recipients may have been censored. To account for this, we report all experimental results using a Tobit regression.

Giving towards the three recipients is significantly correlated, with the correlation coefficients between the pairs of choices ranging from 0.52 to 0.59. If the experimental design induced any order effects, these high degrees of correlation could be problematic for interpretations across recipients. However, the order of dictator decisions was randomised across participants, mitigating the concern that any order effects could interact with treatment effects.

Figure 1: Distributions of giving among participants.
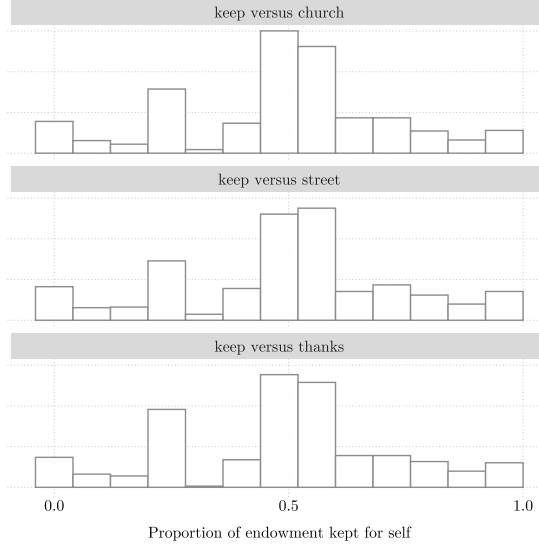
Note Data from 849 participants from weeks with no revival events, pooled across both waves. Participants chose how much of an endowment to allocate between themselves and different recipients. The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019.

We now turn to the discussion of the results. Section 5.3 focuses on the pooled analysis. The question of the comparison of the two waves and the degree of confidence we can reasonably have in the results is discussed in section 5.4.

5.3 Treatment effects

5.3.1 Compared to insurance information, insurance enrolment *decreases* giving to the church and also to the other recipients.

We first examine the main ways in which donation behavior is affected by enrollment into insurance as opposed to the mere provision of insurance information.[25] Figure 2 shows the treatment effects of the three main dictator games of interest. The figure shows separate effects from wave 1 and wave 2 as well as two ways of aggregating the estimates, either by estimating a single effect on the pooled sample or by taking a precision weighted mean of the separate effects as is common in meta-analytic studies (Christensen et al., 2019). Table 3 presents the regression coefficients for the two separate waves as well as for the pooled analysis. Table 3 shows results of Tobit regressions with and without individual controls and dummies for individual churches - for the reasons of representativity just mentioned, the

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[25]This is listed as Test 1 in our pre-analysis plan.

Figure 2: Treatment effects of insurance enrollment
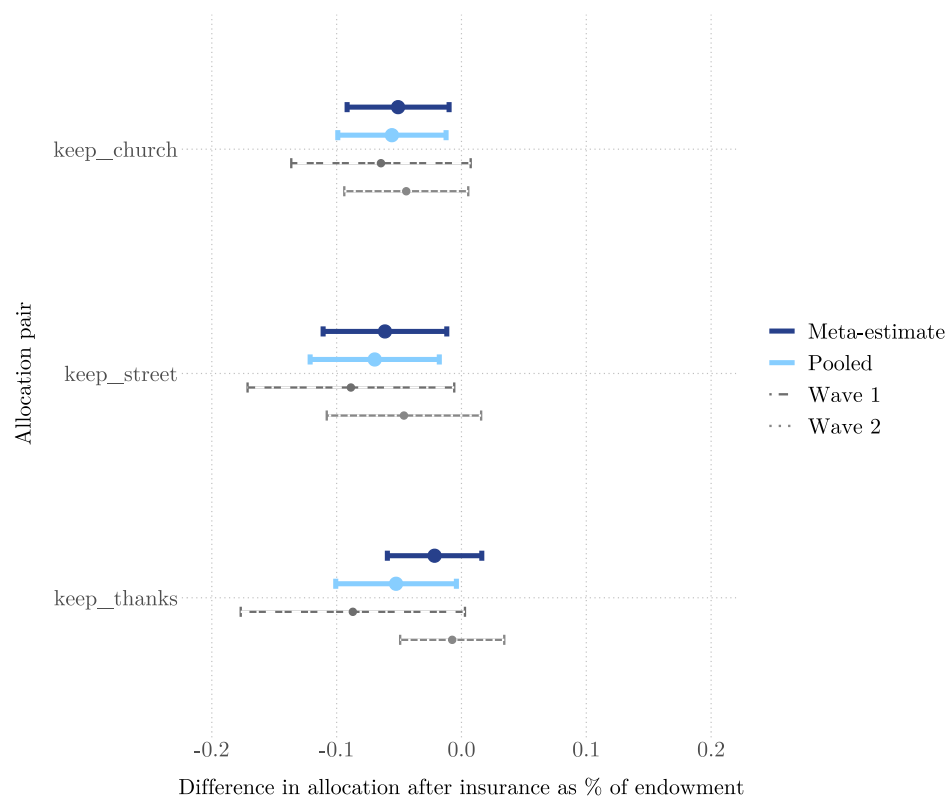
Note Treatment effects estimated from comparison between insurance enrollment and insurance information. Estimates from Tobit regressions including pre-registered covariates as controls. 95% confidence intervals shown.

Table 3: Effects of insurance enrollment compared to insurance information for weeks with no revival events.

	giving to the church		giving to the street		giving to thanksgiving	
	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled sample						
insurance enrollment	−0.064**	−0.056**	−0.064**	−0.069***	−0.055*	−0.052**
	(0.030)	(0.022)	(0.027)	(0.026)	(0.030)	(0.025)
constant	0.554***	0.648***	0.548***	0.588***	0.544***	0.550***
	(0.022)	(0.078)	(0.021)	(0.079)	(0.022)	(0.083)
N	538	504	538	504	538	504
Panel B: Wave 1						
insurance enrollment	−0.083*	−0.064*	−0.084**	−0.089**	−0.085*	−0.087*
	(0.043)	(0.037)	(0.039)	(0.042)	(0.046)	(0.046)
constant	0.531***	0.573***	0.566***	0.561***	0.518***	0.697***
	(0.035)	(0.130)	(0.034)	(0.138)	(0.037)	(0.140)
N	285	251	285	251	285	251
Panel C: Wave 2						
insurance enrollment	−0.039	−0.044*	−0.045	−0.046	−0.018	−0.007
	(0.037)	(0.025)	(0.040)	(0.032)	(0.032)	(0.021)
constant	0.581***	0.483***	0.534***	0.313***	0.573***	0.333***
	(0.025)	(0.091)	(0.027)	(0.109)	(0.022)	(0.098)
N	253	253	253	253	253	253
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. This table corresponds to 'Main Test 1' and 'Main Test 2.1' in the pre-analysis plan. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

results with controls are to be preferred for hypothesis testing.[26]

We find that enrolment into the insurance policy decreases giving to all three recipients compared to those who only receive the information about the insurance but are not enrolled. The treatment effects are also similar for the different recipients. All pooled treatment effects are significant at the 1% or 5% level. A decrease in the amount of donations is predicted by the hypothesis that giving has some element of an insurance motivation. Furthermore, the fact that amounts given to all recipients are similarly affected means that the expected insurance is through meritorious behavior in the eyes of God, and not through paying in to a community insurance fund administered solely by the church. Furthermore the treatment effect is no stronger, and even somewhat weaker, for named (non-anonymous) donations to the church, as can be seen in Table 16 of Appendix B. If community insurance were the main motivation we would expect to see stronger treatment effects for named than for anonymous donations.

The treatment effects are therefore consistent with Hypothesis 2 (spiritual insurance) and inconsistent with Hypothesis 0 (no insurance) and Hypothesis 1 (community insurance). More precisely, the results are consistent with hypotheses H2b and H2c, which predict that enrolment decreases giving to the church and to other recipients respectively. They are inconsistent with Hypothesis H0b, which predicts that enrolment *increases* giving to the church. And although they are consistent with Hypothesis H1b (that enrolment decreases giving to the church) they are inconsistent with Hypothesis H1c (that there is no effect on the other recipients).

5.3.2 The salience effect of insurance information is weakly positive but statistically insignificant.

We now report the effect on donation behavior of a more salient threat of death.[27] Discussing the insurance details could render the risk of death more salient and potentially increase donations. Panel A in Table 4 presents the results of providing insurance information on giving relative to the no insurance information treatment. Participants who received no information on the insurance donated on average 58.2% of their endowment to the church (column 1). Providing insurance information changes

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[26]Tables 19 to 22 in Appendix B show results scaled by standardized outcomes and outcomes in local currency (cedis).
[27]This was listed as Main Test 2 in our pre-analysis plan.

Table 4: Effects of insurance information compared to no insurance for participants in weeks with no revival events.

	giving to the church		giving to the street		giving to thanksgiving	
	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled						
insurance information	0.038	0.032	0.039	0.033	0.016	0.009
	(0.028)	(0.022)	(0.026)	(0.025)	(0.028)	(0.021)
constant	0.516***	0.627***	0.509***	0.609***	0.527***	0.679***
	(0.018)	(0.080)	(0.015)	(0.083)	(0.018)	(0.080)
N	548	519	548	519	548	519
Panel B: Wave 1						
insurance information	0.071*	0.068*	0.091**	0.095**	0.068*	0.061
	(0.041)	(0.037)	(0.042)	(0.043)	(0.041)	(0.037)
constant	0.459***	0.546***	0.475***	0.467***	0.449***	0.597***
	(0.023)	(0.136)	(0.024)	(0.144)	(0.019)	(0.138)
N	289	260	289	260	289	260
Panel C: Wave 2						
insurance information	−0.001	0.009	−0.014	−0.015	−0.045*	−0.034*
	(0.029)	(0.022)	(0.031)	(0.028)	(0.027)	(0.020)
constant	0.582***	0.664***	0.548***	0.586***	0.618***	0.623***
	(0.014)	(0.120)	(0.016)	(0.113)	(0.015)	(0.114)
N	259	259	259	259	259	259
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. This table corresponds to 'Main Test 1' and 'Main Test 2.1' in the pre-analysis plan. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

this amount by 3.3 percentage points, which is not significant. Giving to the street children's fund and to the thanksgiving event are equally not significantly affected. In Panels B and C, the two waves are presented separately. In the first wave, we find a significant salience effect on all recipients, but this is absent in the second wave.

We interpret these results with reference to our model. We model the idea that death becomes more salient with an increase in D. Hypotheses H1a and H2a propose that if insurance is offered through the church (either community based or spiritual), and D is increased, then giving to the church and other recipients should increase. We find that insurance information does not increase giving compared to no insurance. This would be consistent with H0 (no insurance offered through the church) if it were not for our results on enrolment. Alternatively, this is consistent with an incorrect assumption that discussions about death have the same effect as an increase in the size of D.

It is indeed likely that the discussion about death in wave 2 did not translate to a perceived increase in the size of D. The enrollment effects discussed in 5.3.2 are based on a measurable and economically relevant decrease in D (free enrollment into an insurance policy), and provide strong evidence against H0. Furthermore, variability in the ways that insurance information makes D salient is consistent with a growing literature that shows salience effects to be context dependent (Bordalo et al., 2012).

Understanding which attributes of a decision problem become salient, and under which conditions, is an active area of study. Recent contributions in the economics literature have suggested that this is influenced by an individual's memory and experiences (Mullainathan, 2002; Bordalo et al., 2017), that salience also tracks the usefulness of an attribute for predicting future behavior (Schwartzstein, 2014), and that the relative sizes of different outcomes also influences their salience (Bordalo et al., 2012). These channels highlight how the framing and context in which information is presented matters for the salience of attributes of a decision problem. Small differences in the sample population or unavoidable changes in procedure between wave 1 and wave 2 (e.g. different enumerators presenting the description of insurance) might have affected how participants perceived the importance of the risk of death.

This does not imply that the effects of salience are of low scientific interest. In their sermons,

pastors frequently try to make salient various life risks (such as the risk of death, or of joblessness, or marital failure), while suggesting donations as a means of coping with these risks. An interesting avenue for research would be to investigate which conditions need to be fulfilled to find a salience effect that increases donations. Presumably, some pastors are better at it than others.

5.3.3 The effect of insurance (salience plus enrollment) compared to no insurance is positive but not significant at conventional levels.

Table 17 in Appendix B shows that the net effect of the two treatments (the salience effect plus the treatment effect of interest, which work in opposite directions) is to yield an impact of receiving insurance compared to being given no information that is negative but not significant at conventional levels. The model does not provide a clear prediction about this comparison as its sign depends on the size of the salience and the insurance effects. Panel A shows that the overall net effect is not significant. In wave 1 (Panel B), the enrolment and salient effects are of similar magnitudes. In wave 2 (Panel C), where we do not find a significant salience effect, the net effect of insurance is negative although not consistently significant.

Church sermons themselves frequently combine the two effects (salience and insurance enrollment) by talking about certain risks and suggesting donations as a means of coping with these risks. The treatment effect of insurance enrollment is large enough (over 10% of the mean amount donated to the church) to explain why churches appear to invest significant resources in seeking to make this channel of activity credible. In wave 1, insurance enrollment decreased giving only in comparison to the higher donations induced by the salience effect of the insurance information treatment. However, this salience effect was not necessary to observe the enrollment effect in wave 2.

5.4 Replication and robustness of results

5.4.1 Replication of main treatment effect

As described in section 3.3, our study was conducted in two waves in order to verify a heterogeneous treatment effect that can be explained by our model but that we had not pre-registered prior to wave 1. We discuss the heterogeneous treatment effect in section 5.5.2 below. Wave 2 also enabled us to conduct a replication of the treatment effects from wave 1 in normal (non-revival) weeks. This

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allows us to put our results in context with the growing literature on replicability of experimental results in economics and other social sciences.

Camerer et al. (2016) look at 18 laboratory experiments published in leading economics journals between 2011 and 2014. They find that 13 (70%) successfully replicate according to one of four criteria: i) effect sizes are in the same direction and pass the same level of statistical significance, ii) the confidence interval of the new estimates includes the old estimates (Collaboration et al., 2015), iii) the two estimates lie in a prediction interval that accounts for sampling variation in both waves (Patil et al., 2016), and iv) the combined meta-analytic estimate is significant and in the same direction (Christensen et al., 2019; Braver et al., 2014).

We can therefore examine separately the results for wave 1 and wave 2, and see to what extent they fulfil one of the four criteria set out by (Camerer et al., 2016) for successful replication. In our experiment (see Table 3), the effect of insurance enrollment on giving to the church is replicated according to all four assessment criteria. The effect of insurance enrollment on giving to the street children's fund is successfully replicated according to three out of four measures. It does not meet the first criterion—although the wave 2 effect is in the right direction and large enough to be consistent with the results from wave 1, its p-value is greater than 0.1. The fact that our treatment is 40% lower in wave 2, compared to wave 1, due to the erosion of inflation might explain that it is less effective.

The effect on giving to the thanksgiving offering is not replicated according to any criterion. This is also the only outcome we were not able to implement in exactly the same way as in wave 1 as the timing of the thanksgiving event was fixed (as described in Section 3). The national event had already happened shortly beforehand, and our participants might have felt that paying (again) for something that would presumably occur a year later was too distant. Nevertheless, the pooled effect on giving to the thanksgiving offering is in the right direction and statistically significant at the 5% level. The meta-analytic effect is also in the right direction, although its confidence interval includes 0. Reassuringly, this point estimate is contained within the 95% confidence intervals of the meta-analytic estimates for the church and street children's fund outcomes. For the two outcomes that were successfully replicated (giving to the church and giving to the street children), the wave 2 effect sizes were 75% and 62% of the wave 1 effect sizes, respectively.

5.4.2   Robustness: Effect of insurance enrollment on other allocation decisions

Panel A of Table 18 in Appendix B presents the donation levels when participants had to make the choice between two recipient organisations, rather than between a single recipient and the option of keeping money for themselves. It therefore constitutes a robustness test of the previous finding that the treatment effects of salience and enrolment were similar in sign and magnitude across all three recipients, which is a prediction of the theory of spiritual insurance but not of the theory of community insurance. We do not find that church members in the insurance enrollment treatment split their endowment significantly differently from church members who only received the information about the insurance. This therefore constitutes additional supporting evidence in favor of Hypothesis 2 against Hypothesis 1.

5.5   Discussion

5.5.1   How does insurance work?

These experimental results point to an interesting relationship between the type of benefits parishioners might believe they receive from belonging to a church and their willingness to make costly donations to that church. Firstly, treatment effects of insurance enrollment are present across the three recipients. As discussed earlier, neither the street children's fund nor the national thanksgiving offering are linked to the participant's church; and the configuration of our experimental laboratory, with physical partitions between the subjects, rules out any signaling motive to other participants or to church authorities. If the type of insurance the participant associates with their church membership is purely community based, there should not be a treatment effect on giving to these external recipients.

Thus, the fact that the effects we find are similar for giving to the three different types of recipients - the participant' s own church, the thanksgiving association, and the street children fund - indicates that a substantial part of the insurance channel works through beliefs that encourage giving as an act of worship to an interventionist god. The questionnaire supports the idea that church members believe in an interventionist god: less than 2% state that they do not believe god to be involved in

their financial situation, 38% have attended a prayer camp within the last 2 years[28] and 21% even believe that there was a spiritual dimension to the last death in their family.

Still, the questionnaire also provides support for the existence of community-based church motives for many participants in ordinary circumstances. All of the church branches state that they have a welfare fund for church members in need, 22% of participants would ask the church community for financial help if they were in need and 23% have already received financial assistance from the church in the past.

Our results, therefore, do not imply that spiritual insurance is the exclusive or even the main motive behind giving to the church and that community-based insurance does not exist. In ordinary life, church members are unlikely to think only about insurance against funeral expenses when giving donations to the church. Church members face many risks and challenges other than funeral expenses. Even if members think that the risks of death can be managed by undertaking actions that are meritorious in the eyes of God, they may still be attentive also to the benefits that may come from direct assistance from the church when they need it.

5.5.2 Heterogeneous treatment effects: church members during fund-raising events

Up to this point, we have discussed results for church members recruited during normal service weeks. In wave 1, after recruitment, we learnt that two churches had hosted 'revival weeks' during the course of our experiments. Some of their members who participated in the experiment were sampled during those revival weeks. Revival weeks are special periods of church activity where members are encouraged to attend church daily. The services consist of prayer, teaching, singing, and exhortation to give money to the church.[29] In wave 2, we purposely sampled churches that were holding revival weeks while we were collecting data. For two churches, we were able to randomize participation during revival and non-revival weeks on an individual level.

In total, 221 church members across waves 1 and 2 participated in the experiment while they were

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[28]Events organized to pray for miracles, such as healing or finding a marriage partner. See (Arias et al., 2016).

[29](Kwabena, 2015) describes revival meetings as an essential feature of contemporary Pentecostal worship. Access to these material benefits is accomplished through religious activities including "massive revival meetings, summits and conferences, all day prayer services and all-night prophetic vigils and mass evangelistic crusades".

Table 5: Comparing demographic variables and religious behaviour across participants who took part in regular and revival weeks

Variable	Revival = 0	Revival = 1	Difference (p-value)
Age	37.24	36.44	−0.80 (0.44)
Attends church daily	0.04	0.06	0.02 (0.24)
Employed	0.61	0.61	−0.01 (0.84)
Akan ethnicity	0.30	0.41	0.11 (0.00)
Ewe ethnicity	0.19	0.26	0.07 (0.05)
Ga ethnicity	0.13	0.15	0.02 (0.36)
Female	0.67	0.65	−0.02 (0.61)
More than secondary school	0.21	0.26	0.05 (0.12)
Wave 2	0.47	0.45	−0.02 (0.65)
Monthly income, GHS	306.05	317.48	11.42 (0.59)
Prays multiple times per day	0.86	0.91	0.05 (0.02)
Top quartile church giving	0.21	0.26	0.05 (0.14)
Church more than once a week	0.74	0.74	0.00 (0.97)
Believes God involved in finances	0.94	0.96	0.02 (0.24)
Travels more than one hour to church	0.09	0.08	−0.01 (0.76)

Note P-values reported in parentheses are from a t-test of equality of means. Comparisons of pre-registered covariates and some additional variables describing church and spiritual behaviour

in the middle of a revival week.[30] We do not find them to be different from members recruited during regular service weeks for most measures of religious behaviour or demographics (see Table 5). However, for this sample, we find important differences in treatment effects. In both wave 1, wave 2, and the pooled results, we find that after being enrolled in insurance, they *increased* giving to the church. The coefficient on the interaction of the enrolment and the revival week is positive and large (around three to four times the main treatment effect in absolute value), and significant. These results for the total sample are displayed in Table 23 in Appendix C.

Without random assignment for participation we do not know if this effect is due to different types of church members showing up (a selection effect), or a change in behavior due to the revival week itself. In Table 6, we present the results of the experiment we conducted in wave 2 where we randomized assignment to participate in the study during revival weeks. At the time of recruitment, participants were assigned to attend the experiment in a fixed week. They were not given any further incentives to participate during their assigned week. There was low compliance particularly amongst

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[30]The number of church members sampled during revival weeks was lower than the number suggested by power calculations in the wave 2 pre-analysis plan. We attempted to maximize the number of revival week participants by scheduling data collection in a period that overlapped with a number of churches' revival weeks. However, recruitment and randomization into revival weeks was ultimately limited because most churches only hold 3-4 revival events per year, some of which are ad-hoc and need-based, and we did not have continuous access to the churches throughout the year. For one church, we recruited church members only during the revival week and were not able to randomize participation.

Table 6: Effects of attending the experiment during a revival week for the subset of Wave 2 participants where the assigned participation date was randomised with an encouragement design.

| | *Dependent variable:* | | | | | |
| | giving to the church | | giving to the street | | giving to thanksgiving | |
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Non-randomised revival attendance,						
insurance enrollment	−0.047	−0.069***	−0.051	−0.067**	−0.017	−0.017
	(0.039)	(0.025)	(0.040)	(0.031)	(0.033)	(0.022)
revival week	−0.080	−0.072*	−0.041	−0.013	−0.038	0.024
	(0.050)	(0.043)	(0.056)	(0.054)	(0.043)	(0.036)
insurance enrollment x revival week	0.181***	0.243***	0.110	0.149***	0.131**	0.156***
	(0.063)	(0.059)	(0.068)	(0.056)	(0.055)	(0.053)
constant	0.571***	0.666***	0.526***	0.433***	0.561***	0.416***
	(0.027)	(0.093)	(0.029)	(0.109)	(0.023)	(0.111)
N	241	241	242	242	241	241
Panel B: Intention-to-treat estimates of random assignment to participate during a revival week						
insurance enrollment	−0.058	−0.069**	−0.073*	−0.084**	−0.024	−0.025
	(0.040)	(0.028)	(0.041)	(0.037)	(0.035)	(0.027)
assigned to revival	−0.061	−0.052	−0.066	−0.048	−0.058	−0.048
	(0.038)	(0.034)	(0.046)	(0.047)	(0.040)	(0.039)
insurance enrollment x assigned to revival	0.139**	0.137**	0.128*	0.137**	0.085*	0.099**
	(0.056)	(0.053)	(0.066)	(0.063)	(0.051)	(0.050)
constant	0.581***	0.684***	0.546***	0.471***	0.578***	0.493***
	(0.028)	(0.102)	(0.029)	(0.111)	(0.025)	(0.117)
N	241	241	242	242	241	241
Panel C: Instrumental variables estimate of revival week using randomised assignment to a revival week as an instrument for attending during a revival week,						
insurance enrollment	−0.072**	−0.084**	−0.078*	−0.092**	−0.031	−0.035
	(0.036)	(0.035)	(0.041)	(0.042)	(0.038)	(0.039)
revival week	−0.157*	−0.143	−0.157	−0.119	−0.149	−0.137
	(0.094)	(0.104)	(0.107)	(0.123)	(0.098)	(0.114)
insurance enrollment x revival week	0.314**	0.322**	0.268*	0.297**	0.201	0.229
	(0.132)	(0.129)	(0.147)	(0.150)	(0.138)	(0.142)
constant	0.587***	0.688***	0.551***	0.466***	0.583***	0.532***
	(0.027)	(0.113)	(0.030)	(0.134)	(0.028)	(0.124)
N	241	241	242	242	241	241
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. This table corresponds to 'Heterogenous Effect 2' in the pre-analysis plan. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

those who were assigned to revival weeks (see Table 24 in Appendix C) although compliers do not differ from non-compliers in terms of pre-registered demographics (see Tables 5 and 27 in Appendix C). As a result, we report both intention-to-treat and instrumented estimates of the effect of randomized revival attendance.

In Table 6, we show results for wave 2 participants who were part of the revival experiment (i.e. their church held a revival week during data collection and they received a randomized assignment to attend the experiment during a fixed week). In Panel A, we present results for participants who attended the experiment during a revival week, regardless of when they were randomly assigned. Church members who participated in the experiment during the revival week gave significantly more to all recipients when they received the insurance than those who participated during normal church weeks. In Panel B, we use the random assignment to the revival week rather than actual participation and find the same significant and positive effects. Finally, in Panel C, participation during revival week is instrumented with assignment.[31] We find even stronger positive effects of the revival week. Indeed, in this specification, the treatment effect of insurance enrollment on donations to the church and the street children's fund in normal weeks is stronger and has higher statistical significance than the effect reported for wave 2 alone in Table 3.

Referring back to the model, these results are consistent with interpreting the revival week as an upwards shift of θ, the relative weight in our subjects' utility function of church activities compared to secular ones. As equation (38) in the Appendix demonstrates, when equilibrium giving is higher than a given threshold, even in the presence of spiritual insurance, church members respond to an exogenous shock increasing the size of a loss by a decrease in optimal giving. Intuitively, there is a point at which members have already given so much money to the church, that when faced with the prospect of a negative income shock, they prefer to keep money to smooth secular consumption (i.e., when g^* is large, the income effect dominates the substitution effect).

This explanation of the revival week effect is consistent with the types of activities and benefits members are supposed to derive from revival weeks. The results highlight that the spiritual state of church members (captured by θ in the model) matters. Intensive religious participation seems to

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[31]F-statistics from the first stage reported in Table 28.

decrease the demand for spiritual insurance and one might derive that overall demand for insurance, formal or informal, is low during important religious events when individuals already "feel protected".

5.5.3 Exploratory heterogeneity analysis: costly participation and different uses of the church

The previous section highlights that there can be important heterogeneity in the treatment effect due to a temporary shift in θ, the relative weight the individual puts on church activities compared to secular consumption, during revival weeks. However, there can be heterogeneity between individuals in how they value spiritual consumption over secular consumption for a number of other reasons. While measuring θ directly is difficult, our questionnaire includes questions that measure church involvement and religious beliefs. We can use them to explore alternative reasons that θ might differ between individuals, and how these differences in θ interact with our main treatment effects.

To avoid selectively presenting interactions of different variables, we take all the survey questions that asked participants about their church participation to create an index that captures costly church behavior: questions that measure how much time and money participants give up to participate in the church (see Table 14 in Appendix A for descriptive statistics of responses to these questions).[32] We code responses to the questions as dummy variables, and then combine all the dummy variables into an index, taking the mean of all variables weighted by the inverse of their covariance matrix as proposed by Anderson (2008). Details of the construction of the index are provided in Appendix C. The variation of the index is pictured in Figure 3.

We expect the costly behavior index to have a similar effect as participation during a revival week. The intuition from our model is the same: a higher value of spiritual consumption relative to secular consumption (high θ) leads to higher levels of costly church participation. Such high values of spiritual consumption can reach a point where members feel sufficiently protected that the income effect of the insurance enrollment outweighs the substitution effect.

The interaction between the insurance enrollment treatment and the costly participation index is

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[32]The interaction between the treatment and an indicator for donating a lot defined as being in the top 25 percent of givers relative to own income was pre-registered in wave 2. The results separately are displayed in tables 32 - 34 column 2.

displayed in Table 29 in Appendix C. In line with the previous section, we find that members that score highly on the religious participation index have treatment effects that are significantly different from those with lower participation levels. While lower levels of costly participation are associated with decreasing giving to the church after enrollment in insurance, this is not the case for members with higher levels of costly participation.

Another level of potential heterogeneity is that church members differ in the the type of insurance they demand. The average treatment effect of the experiment does not imply that all church members are seeking spiritual insurance. Indeed, it is a weighted average of the effect of church members who are seeking spiritual insurance and church members who seek community or no insurance. Using the survey questionnaire, we try to disentangle different types of church members. As before, we use all questions in the questionnaire that asked about beliefs or uses of the church for financial purposes or as a social network (Table 8 in Appendix A) and questions that asked for beliefs or uses of the church as a center for spiritual activity (see Table 15 in Appendix A for summary statistics). We create the two indices with the same method as the costly participation index. Their variation and correlations are displayed in the same Figure 3.

Figure 3 shows that most church members state spiritual reasons for going to church and there is little variation in the index (see Appendix C for a longer discussion of this). The index for using the church as a financial and social network has more variation and a majority of church members score relatively low on this measure. Tables 30 and 31 in Appendix C present results for the interactions between the insurance enrollment treatment and the ways participants report using the church.[33] We do not find that church members with high values in the spiritual motive index react differently to the treatment. On the contrary, those who score high on the network index give significantly less to their own church and the street children's fund after being enrolled in insurance. These results are consistent with both community-based insurance and spiritual insurance (represented by the decrease in giving to the street children's fund).

These results illustrate that while we can identify differences in the intensity of costly behavior (a proxy for the level of θ), we are not able to cleanly identify differences between church members in

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[33]Tables 32 to 40 in Appendix C provide more detailed regressions with individual questionnaire answers as independent regressors.

the type of insurance they seek. Indeed, the lack of variation in the spiritual index shows that most church members seek at least some spiritual or moral dimension in their churches.

6   Conclusion

We conducted a lab-in-the-field experiment with church members from an established Pentecostal church in Accra, Ghana. We find evidence for religious and charitable giving being part of a church member's risk-coping strategy. This spiritual insurance channel does not contradict the possibility that other church community-based mechanisms exist in parallel. Indeed, survey responses from church members and leaders emphasize the important role the church plays as a financial contributor. However, our experimental findings add nuance to the literature on religious institutions as coordinating platforms by demonstrating that adherents might care at least as much about spiritual insurance (affecting outcomes through signalling to an interventionist God) as they do about material insurance (accessing transfers of goods and services from other church members).

The treatment effects obtained within the church population depend on three important factors. First, Pentecostal churches stress the involvement of God in terms of blessings in everyday life and teach about God rewarding religious and charitable giving. This particular religious discourse makes members of these churches more prone to see charitable behaviour as a means to decrease the risk of bad events happening and to increase the occurrence of good events. Second, trust in the insurance is fundamental, especially in a context where formal institutions are generally weak. In our case, the church was used as a coordinator for the insurance scheme and participants seemed to trust the insurance because it was coordinated by their pastor.[34] Finally, our results obviously depend on the absence (or limited presence) of better institutions to deal with risk. As long as these three conditions are met we expect our results to hold. In particular we believe that our results would hold in other Pentecostal churches and settings where the development of formal insurance is low. Since beliefs in religious rituals that influence immediate events are common among a variety of religions and faiths in developing countries, it would be interesting to reproduce the experiment in a different religious setting.

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[34]By contrast when we tried to run a similar experiment with the market association, the insurance enrollment failed to yield any effect because market participants did not trust the head of the market association who was chosen to administrate the insurance scheme.

The experiment stressed the importance of religion for economic decisions made by individuals in a setting with weak formal institutions. While individuals might belong to religious institutions in those settings because they offer risk-mitigating strategies, we show that formal, private insurance can at least partially substitute for spiritual based insurance mechanisms. Since the church was used as a credible coordinator for the insurance scheme, we are inclined to see religious institutions in this context as opportunities to spread formal insurance rather than as an obstacle to its development.

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7 Appendices

7.1 Appendix A: Additional descriptive statistics of the experiment and participants

Table 7: The social role of the church

Is it important for you that your close friends come from the same church as you?

Yes, I try to only make friends with people from my church	0.17
Yes, I try to seek people from my church but it is not so important	0.36
No, it is not important at all	0.43

Who do you go to when you need counselling about family or personal issues (Select all that apply)

Family	0.45
Church leadership	0.32
Church community	0.26
Friends	0.22
No one	0.07
Medical professional	0.04
Work superior	0.04
Other	0.03
Formal financial services (bank, microfinance, etc.)	0.03
Formal social services (government or NGO	0.00

Who do you go to for support when you have a health emergency? (Select all that apply)

Medical professional	0.52
Family	0.35
Church leadership	0.12
Friends	0.10
No one	0.06
Church community	0.04
Traditional healer	0.02
Work superior	0.02
Other	0.01
Formal financial services (bank, microfinance, etc.)	0.01
Formal social services (government or NGO	0.01

Table 8: The financial role of the church

Do you work or do business with people from the same church as you?	
Yes, I only work or do business with people from my church	0.09
Yes, I try to do business with people from my church but it is not so important	0.33
No, I prefer not to work or do business with people from my church	0.01
No, it is not important at all	0.52
Who do you go to when you need financial help? (Select all that apply)	
Family	0.54
Friends	0.28
Church community	0.22
Formal financial services (bank, microfinance, etc.)	0.16
No one	0.11
Formal social services (government or NGO	0.05
Other	0.04
Work superior	0.03
How is God involved in your finances?	
God blesses me with financial abundance	0.30
God is not interested in my finances	0.00
God leaves me to run my own financial affairs	0.01
God provides enough that I do not suffer	0.64
Have you received financial assistance from your church in the last 5 years?	
Yes	0.21
No	0.75

Table 9: Summary statistics of interviewed church branches

Variable	Mean	Std. Dev.	Min.	Max.	N
Year Founded	1990.3	6.651	1972	1994	10
Number of church members (approx.)	775.818	771.593	300	2500	11
Church members have an education level lower than average	45.5%				11
Church members have income higher than average	45.5%				11
Average number attending Sunday service	487.273	458.892	150	1500	11
Average amount received on a Sunday	487.273	458.892	150	1500	11
The church owns its building	90.9%				11
The church owns other properties	9.1%				11
Number of paid staff	6.273	3.036	1	13	11
The church has a welfare fund	100%				11

Note: All main churches were contacted for interviews However, due to scheduling conflicts we were not able to meet the senior pastors of three main churches to conduct the interviews. Information about each individual church branch can be found in Table 10 in the Appendix.

Table 10: Information on interviewed church branches

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year founded	1988	1993	1994	1993	1972	1993	1992	1994	1992	1992	.
Number of church members (approx.)	2500	300	500	500	2114	300	450	700	350	300	520
Church members' education compared to average	Higher	Lower	Average	Lower	Higher	Lower	Lower	Lower	Average	Average	Average
Church members' income compared to average	Average	Average	Average	Lower	Higher	Lower	Lower	Lower	Average	Average	Lower
Average number attending Sunday service	1500	250	200	300	1260	150	250	500	200	250	500
Average amount received on a Sunday	.	2000	.	300	.	.	300	1200	600	475	900
The church owns its building	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
The church owns other properties	No	No	No	No	Yes	No	No	No	No	No	No
Number of paid staff	8	4	6	8	13	1	4	7	5	6	7
The church has a welfare fund	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 11: Number of people participating across insurance and revival treatments and two waves of data collection

Wave	Revival	Insurance	Insurance Information	No Insurance	Wave totals	Revival Total
1	1	38	50	34	122	221
2	1	40	39	20	99	
1	0	165	120	169	454	849
2	0	136	117	142	395	
		379	**326**	**365**		**1070**

Table 12: Mean values of additional demographic variables that were not pre-registered

Variable	wave = 1	wave = 2	Difference (p-value)
Is married	0.40	0.47	0.07 (0.03)
Has always belonged to this church	0.00	0.44	0.44 (0.00)
Registered for National Health Insurance	0.33	0.85	0.52 (0.00)
Has any other sort of insurance	0.18	0.10	−0.08 (0.00)
Met or will meet spouse in church	0.43	0.34	−0.09 (0.01)

Note P-values reported in parentheses are from a t-test of equality of means.

Table 13: Pre-registered covariates compared across waves.

| Summary of covariates across waves. | | | | |
Variable	Wave 1	Wave 2	Difference (p-value)	Ghana census 2010
Age	35.77	38.47	2.70 (0.00)	36.49
Female	0.61	0.73	0.12 (0.00)	0.52
Monthly income, GHS	359.11	254.14	−104.97 (0.00)	
Employed	0.56	0.68	0.12 (0.00)	0.69
More than secondary school	0.28	0.15	−0.13 (0.00)	
Akan ethnicity	0.42	0.21	−0.21 (0.00)	0.39
Ewe ethnicity	0.21	0.19	−0.02 (0.46)	0.20
Ga ethnicity	0.15	0.11	−0.03 (0.10)	0.25
Attends church daily	0.08	0.01	−0.06 (0.00)	
Prays multiple times per day	0.84	0.91	0.07 (0.00)	
Attended during revival week	0.21	0.20	−0.01 (0.65)	

Note P-values reported in parentheses are from a t-test of equality of means. 'Ghana census 2010' column reflects data for census population above the age of 18 living in the Greater Accra region.

Table 14: Costly religious behaviour

Share of income given to the church each month, excluding tithes.

Min	Q1	Median	Mean	Q3	Max
0.00	0.02	0.03	0.06	0.07	1.25

How many times per week or per year do you attend your church?

Daily	0.05
More than once per week	0.74
Weekly	0.15
A few times per month	0.01
A few times per year	0.00
Less than once a year	0.00

How many hours do you travel to attend your regular church?

30 minutes to 1 hour	0.43
Less than 30 minutes	0.45
More than 1 hour	0.08

Have you moved your place of residence in order to be closer to your church?

Yes	0.09
No	0.87

Have you changed the food you eat or drink for religious reasons

Yes	0.35
No	0.61

Have you ever gone into debt to pay a church debt?

Yes	0.21
No	0.75

In the last 6 weeks, have you engaged in any of the following activities to bring others to your church? (Select all that apply)

Inviting friends or family to church	0.62
Praying for others to attend church	0.44
Preaching or teaching outsidethe church	0.33
Distributing church material	0.15
Preaching or teaching in the church	0.11
public_speaking	0.02

Are you engaged in any of the following ministries of your church? (Select all that apply)

Men, women, or youth fellowship	0.74
Home fellowship	0.28
Choir, praise and worship	0.21
Prayer ministry	0.15
Ushering or protocol	0.10
Outreach ministry	0.09
Children's ministry	0.04
Pastoring or deacon	0.02

Number of church ministries, and proportion of participants enagaged in that number of ministries

0	1	2	3	4	5	6
0.12	0.42	0.27	0.13	0.05	0.01	0.00

Table 15: Religious beliefs and attitudes

What are the main reasons you are with your current church?	
The teaching about God corresponds to what I believe in	0.87
I go for the moral guidance to me and my family	0.52
I like the atmosphere of the services	0.32
Friends or relatives brought me there	0.30
Other members made an effort to welcome me	0.17
The congregation contains many interesting and successful people	0.12
I hope to meet a good marriage partner for me or my children	0.11
The building is close to my home	0.06
The facilities are comfortable (e.g. air-conditioning, comfortable seating, etc.)	0.05
Does giving to charity serve the same spiritual duty as giving directly to the church?	
I do not think I have a duty to either.	0.00
No, charity is less important	0.10
No, charity is more important	0.25
Yes, they are equally important	0.61
Within the last 2 years, have you ever attended a prayer camp either for yourself or on behalf of a friend or family member?	
Yes	0.36
No	0.60
Do you believe the last death in your family was a spiritual attack?	
Yes	0.20
No	0.74

8 Appendix B: Additional analysis of choice data and alternative specifications

Table 16: Effects of insurance treatments on non-anonymous giving to the church.

	keep vs church (1)	keep vs churchnamed (2)	church vs churchnamed (3)	churchnamed vs street (4)	churchnamed vs thanks (5)
	Dependent variable:				
Panel A: Insurance enrollment compared to insurance information, N = 504					
insurance enrollment	−0.056**	−0.036	0.027	−0.012	0.010
	(0.022)	(0.025)	(0.035)	(0.019)	(0.022)
constant	0.648***	0.567***	0.367***	0.644***	0.744***
	(0.078)	(0.096)	(0.133)	(0.062)	(0.083)
N	504	504	504	504	504
Panel B: Insurance information compared to no insurance, N = 519					
insurance information	0.032	0.001	−0.018	0.006	0.008
	(0.022)	(0.023)	(0.034)	(0.020)	(0.018)
constant	0.627***	0.635***	0.490***	0.492***	0.490***
	(0.080)	(0.084)	(0.132)	(0.075)	(0.070)
N	519	519	519	519	519
Individual controls	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated considering non-anonymous giving to the church. The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave.

Table 17: Effects of insurance enrollment compared to receiving nothing for participants in weeks with no revival weekevents

	giving to the church		giving to the street		giving to thanksgiving	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled						
insurance enrollment	−0.025	−0.017	−0.025	−0.020	−0.037*	−0.027
	(0.023)	(0.018)	(0.023)	(0.021)	(0.021)	(0.018)
constant	0.465***	0.602***	0.490***	0.504***	0.460***	0.630***
	(0.019)	(0.088)	(0.019)	(0.111)	(0.016)	(0.074)
N	612	575	612	575	612	575
Panel B: Wave 1 only						
insurance enrollment	−0.011	−0.015	0.008	0.002	−0.014	−0.017
	(0.035)	(0.026)	(0.034)	(0.030)	(0.032)	(0.027)
constant	0.459***	0.505***	0.474***	0.534***	0.449***	0.745***
	(0.024)	(0.171)	(0.024)	(0.163)	(0.018)	(0.145)
N	334	297	334	297	334	297
Individual controls	NO	YES	NO	YES	NO	YES
Panel C: Wave 2 only						
insurance enrollment	−0.040	−0.027	−0.058*	−0.042	−0.063**	−0.040*
	(0.030)	(0.024)	(0.033)	(0.028)	(0.027)	(0.021)
constant	0.582***	0.561***	0.548***	0.359***	0.618***	0.485***
	(0.014)	(0.106)	(0.016)	(0.127)	(0.015)	(0.091)
N	278	278	278	278	278	278
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. This table corresponds to 'Secondary Test 1' in the pre-analysis plan. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 18: Effects of insurance treatments on all other allocation decisions.

	Dependent variable:		
	church vs street	church vs thanks	street vs thanks
	(1)	(2)	(3)
Panel A: Insurance enrollment compared to insurance information, N = 504			
insurance enrollment	−0.027*	−0.003	−0.022
	(0.016)	(0.017)	(0.016)
constant	0.532***	0.498***	0.595***
	(0.057)	(0.067)	(0.066)
N	504	504	504
Panel B: Insurance information compared to no insurance, N = 519			
insurance information	−0.014	−0.011	0.014
	(0.017)	(0.016)	(0.015)
constant	0.453***	0.465***	0.528***
	(0.061)	(0.051)	(0.050)
N	519	519	519
Individual controls	YES	YES	YES
Church dummies	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated between the different outcomes. The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave.

Table 19: Effects of insurance enrollment compared to insurance information with standardized outcomes.

| | *Dependent variable:* | | | | | |
| | giving to the church | | giving to the street | | giving to thanksgiving | |
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Wave 1						
insurance enrollment	−0.317**	−0.248*	−0.280**	−0.285**	−0.257*	−0.228
	(0.124)	(0.129)	(0.120)	(0.132)	(0.138)	(0.147)
constant	−0.180**	−0.015	−0.028	0.123	−0.216**	0.487
	(0.089)	(0.488)	(0.089)	(0.491)	(0.103)	(0.536)
N	285	251	285	251	285	251
Panel B: Wave 2						
insurance enrollment	−0.164	−0.187*	−0.179	−0.177	−0.074	−0.025
	(0.106)	(0.104)	(0.119)	(0.122)	(0.112)	(0.112)
constant	0.381***	−0.071	0.206**	−0.747*	0.335***	−0.676
	(0.077)	(0.370)	(0.089)	(0.415)	(0.083)	(0.450)
N	253	253	253	253	253	253
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is standardized cedi amounts (standardized with respect to the wave mean and standard deviation) that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 20: Effects of insurance information compared to no insurance with standardized outcomes.

	giving to the church		giving to the street		giving to thanksgiving	
	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Wave 1						
insurance information	0.206*	0.180	0.272**	0.266**	0.176	0.156
	(0.114)	(0.117)	(0.118)	(0.130)	(0.122)	(0.132)
constant	−0.396***	−0.134	−0.304***	−0.224	−0.409***	0.154
	(0.074)	(0.408)	(0.076)	(0.444)	(0.074)	(0.467)
N	289	260	289	260	289	260
Panel B: Wave 2						
insurance information	−0.005	0.039	−0.053	−0.056	−0.181*	−0.140
	(0.098)	(0.092)	(0.111)	(0.110)	(0.106)	(0.100)
constant	0.386***	0.728*	0.259***	0.378	0.516***	0.546
	(0.061)	(0.384)	(0.066)	(0.418)	(0.065)	(0.412)
N	259	259	259	259	259	259
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is standardized cedi amounts (standardized with respect to the wave mean and standard deviation) that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 21: Effects of insurance enrollment compared to insurance information using cedi outcomes, separated by wave.

	Dependent variable:					
	giving to the church		giving to the street		giving to thanksgiving	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Wave 1, 2015 cedi value						
insurance enrollment	−0.915*	−0.709*	−0.926**	−0.974**	−0.930*	−0.957*
	(0.471)	(0.403)	(0.434)	(0.465)	(0.502)	(0.504)
constant	5.846***	6.308***	6.227***	6.171***	5.703***	7.665***
	(0.385)	(1.433)	(0.377)	(1.523)	(0.408)	(1.540)
N	285	251	285	251	285	251
Panel B: Wave 2, 2019 cedi value (approximately 1.6 x 2015 cedi value)						
insurance enrollment	−0.738	−0.840*	−0.854	−0.876	−0.347	−0.141
	(0.695)	(0.481)	(0.756)	(0.599)	(0.603)	(0.404)
constant	11.039***	9.177***	10.141***	5.950***	10.885***	6.321***
	(0.479)	(1.727)	(0.511)	(2.062)	(0.416)	(1.859)
N	253	253	253	253	253	253
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the cedi amount (unadjusted for inflation) that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 22: Effects of receiving insurance information compared to receiving nothing using cedi outcomes, separated by wave.

	giving to the church		giving to the street		giving to thanksgiving	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Wave 1, 2015 cedi value						
insurance information	0.778*	0.752*	1.004**	1.040**	0.746*	0.668
	(0.450)	(0.412)	(0.457)	(0.476)	(0.448)	(0.408)
constant	5.045***	6.008***	5.220***	5.137***	4.937***	6.570***
	(0.256)	(1.500)	(0.266)	(1.580)	(0.204)	(1.516)
N	289	260	289	260	289	260
Panel B: Wave 2, 2019 cedi value (approximately 1.6 x 2015 cedi value)						
insurance information	−0.026	0.165	−0.259	−0.276	−0.849*	−0.654*
	(0.557)	(0.423)	(0.591)	(0.527)	(0.513)	(0.376)
constant	11.064***	12.614***	10.408***	11.143***	11.735***	11.840***
	(0.271)	(2.273)	(0.295)	(2.142)	(0.291)	(2.159)
N	259	259	259	259	259	259
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the cedi amount (unadjusted for inflation) that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

9 Appendix C: Heterogeneity of the main treatment effects

9.1 Revival week results

9.1.1 Pooled sample revival week results

Table 23: Effects of insurance enrollment and insurance information with a dummy for participation during revival week

	Dependent variable:					
	giving to the church		giving to the street		giving to thanksgiving	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Revival effects, insurance enrollment compared to insurance information						
insurance enrollment	−0.064**	−0.060***	−0.064**	−0.072***	−0.055*	−0.055**
	(0.030)	(0.023)	(0.027)	(0.026)	(0.030)	(0.026)
revival week	−0.144***	−0.145***	−0.132***	−0.114***	−0.135***	−0.109**
	(0.039)	(0.038)	(0.037)	(0.032)	(0.045)	(0.046)
insurance enrollment x revival week	0.242***	0.252***	0.196***	0.205***	0.196***	0.188***
	(0.057)	(0.048)	(0.047)	(0.042)	(0.058)	(0.045)
constant	0.555***	0.625***	0.548***	0.532***	0.544***	0.504***
	(0.022)	(0.080)	(0.021)	(0.075)	(0.022)	(0.071)
N	704	667	705	668	704	667
Panel B: Revival effects Insurance information compared to nothing						
insurance information	0.038	0.039*	0.039	0.040	0.016	0.016
	(0.028)	(0.023)	(0.026)	(0.025)	(0.028)	(0.022)
revival week	0.024	0.031	−0.002	−0.039	−0.032	−0.046
	(0.055)	(0.048)	(0.044)	(0.048)	(0.060)	(0.059)
insurance information x revival week	−0.166**	−0.186***	−0.129**	−0.111**	−0.102	−0.104
	(0.067)	(0.057)	(0.057)	(0.052)	(0.076)	(0.067)
constant	0.516***	0.600***	0.509***	0.547***	0.527***	0.590***
	(0.018)	(0.076)	(0.015)	(0.072)	(0.018)	(0.072)
N	690	659	690	659	690	659
Individual controls	NO	YES	NO	YES	NO	YES
Church dummies	NO	YES	NO	YES	NO	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. This table corresponds to 'Heterogenous Effect 1' in the pre-analysis plan. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

9.1.2 Wave 2 revival week experiment

Table 24: Recruitment and assignment of revival participation in Wave 2

Total recruited in Wave 2			494
Number randomly assigned to attend the experiment	regular week	revival week	total
	255	114	369
Proportion complying with treatment assignment	0.95	0.39	

Table 25: Balance amongst randomly assigned revival participants

Variable	Revival = 0	Revival = 1	Difference (p-value)
Age	40.52	38.38	2.13 (0.28)
Attends church daily	0.02	0.02	0.00 (0.95)
Employed	0.69	0.68	0.00 (0.94)
Akan ethnicity	0.38	0.16	0.22 (0.00)
Ewe ethnicity	0.29	0.17	0.13 (0.05)
Ga ethnicity	0.24	0.08	0.16 (0.01)
Female	0.74	0.74	0.00 (0.98)
More than secondary school	0.09	0.17	−0.09 (0.04)
Monthly income, GHS	257.61	255.60	2.00 (0.94)
Prays multiple times per day	0.88	0.92	−0.04 (0.34)
Top quartile church giving	0.31	0.15	0.16 (0.02)
Church more than once a week	0.79	0.87	−0.08 (0.16)
Believes God involved in finances	0.93	0.99	−0.06 (0.11)
Travels more than one hour to church	0.03	0.07	−0.04 (0.20)

Table 26: Comparing participants who complied with revival week treatment assignment: assigned to revival and complied compared to assigned to regular week and complied.

Variable	Revival = 0	Revival = 1	Difference (p-value)
Age	41.04	38.35	2.70 (0.25)
Attends church daily	0.02	0.02	0.01 (0.81)
Employed	0.69	0.69	0.00 (0.96)
Akan ethnicity	0.42	0.15	0.28 (0.00)
Ewe ethnicity	0.29	0.18	0.11 (0.13)
Ga ethnicity	0.20	0.10	0.10 (0.10)
Female	0.71	0.73	−0.02 (0.80)
More than secondary school	0.09	0.21	−0.12 (0.02)
Monthly income, GHS	273.25	271.51	1.74 (0.96)
Prays multiple times per day	0.89	0.94	−0.05 (0.33)
Top quartile church giving	0.30	0.15	0.15 (0.05)
Church more than once a week	0.80	0.87	−0.07 (0.30)
Believes God involved in finances	0.93	0.98	−0.05 (0.20)
Travels more than one hour to church	0.04	0.07	−0.03 (0.40)

Table 27: Comparing participants who complied with treatment assignment to participants who did not comply with treatment assignment.

Variable	Complier = 0	Not complier = 1	Difference (p-value)
Age	38.53	38.77	0.24 (0.88)
Attends church daily	0.01	0.02	0.01 (0.71)
Employed	0.66	0.69	0.03 (0.62)
Akan ethnicity	0.20	0.19	−0.02 (0.75)
Ewe ethnicity	0.16	0.20	0.04 (0.40)
Ga ethnicity	0.10	0.11	0.02 (0.68)
Female	0.78	0.73	−0.06 (0.29)
More than secondary school	0.06	0.19	0.13 (0.00)
Monthly income, GHS	201.26	271.78	70.52 (0.00)
Prays multiple times per day	0.87	0.93	0.06 (0.12)
Top quartile church giving	0.17	0.17	0.01 (0.88)
Church more than once a week	0.88	0.86	−0.02 (0.58)
Believes God involved in finances	0.99	0.98	−0.01 (0.41)
Travels more than one hour to church	0.05	0.07	0.02 (0.44)

Table 28: F-statistics for weak instrument tests for first stage reported in Table 6

	no controls	with controls
revival x insurance	38.33	31.42
revival	37.96	29.62

9.1.3 Exploratory results on heterogeneity by church behaviour and reported attitudes

Creation of the indexes We create an index that measures costly church participation. The index sums the following indicators: An indicator for the members that give most as a proportion of their income[35], if they have borrowed money for a church pledge, if they restrict their food or alcohol consumption for religious reasons, if they travel for more than one hour to reach the church, if they have moved to be closer to the church and if they attend church on a weekly basis. The index is then weighted by the inverse of the covariance matrix of the individuals indicators (as in Anderson (2008)). The left upper panel in Figure 3 shows the distribution of the summary index for costly church participation. Most members fulfill one or two of the criteria, but there is variation toward the upper tail.

Using the survey questionnaire, we try to disentangle different types of church members. We create an index to measure if church members go to the church for spiritual reasons. We also create a summary index that measures if church members put an emphasis on the church community and the financial services they offer. The spiritual motives index sums weighted indicators for church reason

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[35]Stated church donations are divided be their income and church members that fall into the highest quartile are defined as high givers. The quartiles are defined by wave.

that we define as spiritual[36], if they believe that God is involved in their finances[37], if they believe in a spiritual element in the last death in their family and if they had lately attended a prayer camp (where people pray for a specific occasion).

For the index that measures the usage of the church community as a finance-related network, we use weighted indicators if the church members has already received financial assistance, if they would go to the church community if they had financial problems, if they prefer to do business and make friends with church members and if they state community-related reasons to go to church[38].

Figure 3: Correlations between indexes summarizing church use and behaviour
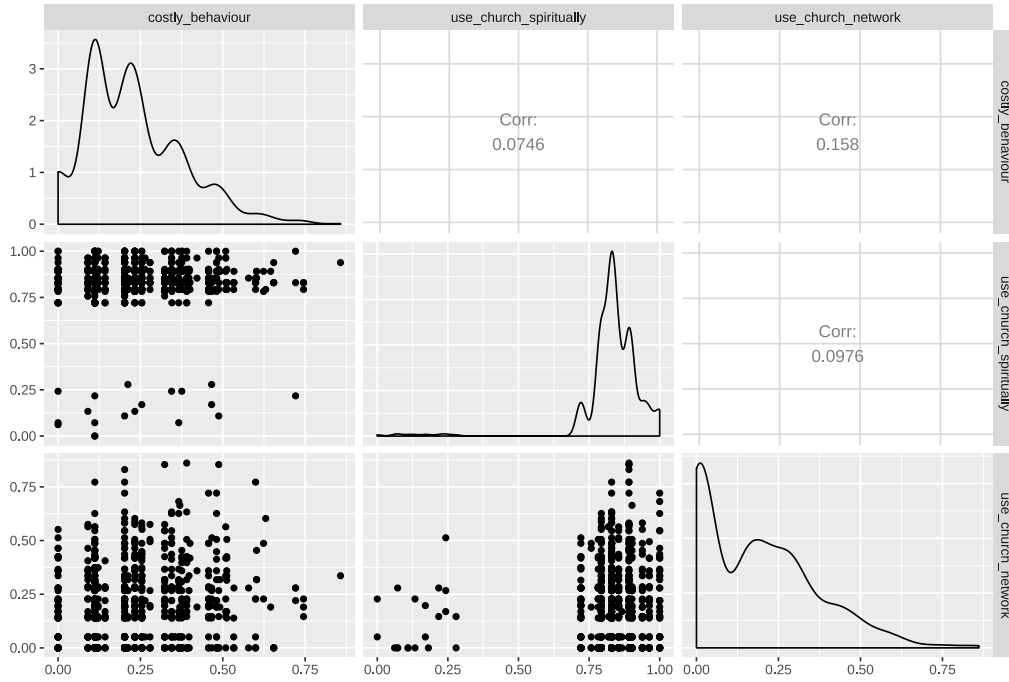
Note Index variables created out of questionnaire data. Responses to all questions were categorized into one of three groups: the extent of costly (time or money) participation in church activities, and two indexes indicating whether the participant used the church for i. spiritual needs and ii. as a financial or social network. The figure shows correlations between the index variables (visually in the lower panels and in numbers in the upper panels), as well as the distributions of each index for the total sample along the diagonal.

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[36]If respondents declare in question 31 that one of the reason they go to their current church is "The teaching about God corresponds to what I believe in" and "I go for the moral guidance to me and my family".

[37]Question 52, response "God provides enough that I do not suffer" or "God blesses me with financial abundance".

[38]If respondents declare in question 31 that one of the reason they go to their current church is "Other members made an effort to welcome me" and "The congregation contains many interesting and successful people".

Table 29: Costly Behaviour: keep v church, keep v street, keep v thanks

	Dependent variable:		
	keep vs church	keep vs street	keep vs thanks
	(1)	(2)	(3)
insurance enrollment	−0.128***	−0.127**	−0.116***
	(0.042)	(0.054)	(0.042)
costly_behaviour	−0.191	−0.223*	−0.241***
	(0.116)	(0.130)	(0.090)
insurance enrollment x costly_behaviour	0.346**	0.304	0.328**
	(0.166)	(0.203)	(0.149)
constant	0.709***	0.638***	0.710***
	(0.095)	(0.109)	(0.097)
N	470	470	470
Individual controls	YES	YES	YES
Church dummies	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave.

Table 30: Use Church Spiritually: keep v church, keep v street, keep v thanks

	Dependent variable:		
	keep vs church	keep vs street	keep vs thanks
	(1)	(2)	(3)
insurance enrollment	−0.139	−0.113	−0.168
	(0.149)	(0.215)	(0.186)
use_church_spiritually	−0.194	−0.068	−0.227
	(0.150)	(0.229)	(0.190)
insurance enrollment x use_church_spiritually	0.092	0.042	0.128
	(0.172)	(0.246)	(0.219)
constant	0.815***	0.630***	0.738***
	(0.155)	(0.221)	(0.188)
N	490	490	490
Individual controls	YES	YES	YES
Church dummies	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave.

Table 31: Use Church Network: keep v church, keep v street, keep v thanks

	Dependent variable:		
	keep vs church	keep vs street	keep vs thanks
	(1)	(2)	(3)
insurance enrollment	−0.013	−0.025	−0.062*
	(0.031)	(0.036)	(0.032)
use_church_network	0.055	0.080	−0.062
	(0.056)	(0.089)	(0.093)
insurance enrollment x use_church_network	−0.218**	−0.229*	0.043
	(0.103)	(0.124)	(0.117)
constant	0.642***	0.578***	0.560***
	(0.076)	(0.079)	(0.085)
N	503	503	503
Individual controls	YES	YES	YES
Church dummies	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave.

Table 32: Costly Behaviour: keep versus church

	Dependent variable:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
insurance enrollment	−0.128***	−0.067***	−0.097**	−0.046	−0.048**	−0.067***	−0.082***
	(0.042)	(0.026)	(0.046)	(0.033)	(0.024)	(0.026)	(0.023)
costly_behaviour	−0.191						
	(0.116)						
insurance enrollment x costly_behaviour	0.346**						
	(0.166)						
high_giver		−0.012					
		(0.043)					
insurance enrollment x high_giver		0.080*					
		(0.048)					
church_sevweekly			−0.061				
			(0.048)				
insurance enrollment x church_sevweekly			0.053				
			(0.060)				
changed_food_drink_religious				0.032			
				(0.036)			
insurance enrollment x changed_food_drink_religious				−0.026			
				(0.055)			
travels_more_than_hour					0.052		
					(0.078)		
insurance enrollment x travels_more_than_hour					−0.088		
					(0.100)		
took_debt_for_church						−0.023	
						(0.037)	
insurance enrollment x took_debt_for_church						0.057	
						(0.052)	
moved_for_church							−0.172***
							(0.034)
insurance enrollment x moved_for_church							0.263***
							(0.084)
constant	0.709***	0.629***	0.696***	0.636***	0.645***	0.648***	0.659***
	(0.095)	(0.106)	(0.086)	(0.080)	(0.080)	(0.077)	(0.076)
N	470	471	504	502	503	503	503
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 33: Costly Behaviour: keep versus street

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Dependent variable:			
insurance enrollment	−0.127**	−0.080***	−0.057	−0.077**	−0.068**	−0.089***	−0.083***
	(0.054)	(0.029)	(0.060)	(0.034)	(0.028)	(0.030)	(0.029)
costly_behaviour	−0.223*						
	(0.130)						
insurance enrollment x costly_behaviour	0.304						
	(0.203)						
high_giver		−0.080					
		(0.054)					
insurance enrollment x high_giver		0.101					
		(0.062)					
church_sevweekly			−0.045				
			(0.052)				
insurance enrollment x church_sevweekly			−0.017				
			(0.070)				
changed_food_drink_religious				−0.014			
				(0.037)			
insurance enrollment x changed_food_drink_religious				0.019			
				(0.052)			
travels_more_than_hour					0.024		
					(0.074)		
insurance enrollment x travels_more_than_hour					−0.018		
					(0.094)		
took_debt_for_church						−0.007	
						(0.045)	
insurance enrollment x took_debt_for_church						0.092	
						(0.064)	
moved_for_church							−0.131***
							(0.035)
insurance enrollment x moved_for_church							0.115
							(0.078)
constant	0.638***	0.643***	0.629***	0.594***	0.586***	0.579***	0.593***
	(0.109)	(0.123)	(0.098)	(0.083)	(0.080)	(0.080)	(0.078)
N	470	471	504	502	503	503	503
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 34: Costly Behaviour: keep versus thanks

	Dependent variable:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
insurance enrollment	−0.116***	−0.043	−0.082	−0.069*	−0.046*	−0.063**	−0.078***
	(0.042)	(0.030)	(0.053)	(0.039)	(0.024)	(0.029)	(0.026)
costly_behaviour	−0.241***						
	(0.090)						
insurance enrollment x costly_behaviour	0.328**						
	(0.149)						
high_giver		−0.033					
		(0.060)					
insurance enrollment x high_giver		0.009					
		(0.065)					
church_sevweekly			−0.058				
			(0.049)				
insurance enrollment x church_sevweekly			0.037				
			(0.062)				
changed_food_drink_religious				−0.014			
				(0.039)			
insurance enrollment x changed_food_drink_religious				0.045			
				(0.059)			
travels_more_than_hour					0.066		
					(0.067)		
insurance enrollment x travels_more_than_hour					−0.073		
					(0.094)		
took_debt_for_church						−0.039	
						(0.040)	
insurance enrollment x took_debt_for_church						0.049	
						(0.060)	
moved_for_church							−0.186***
							(0.032)
insurance enrollment x moved_for_church							0.255***
							(0.068)
constant	0.710***	0.699***	0.597***	0.559***	0.545***	0.554***	0.558***
	(0.097)	(0.119)	(0.085)	(0.087)	(0.083)	(0.082)	(0.077)
N	470	471	504	502	503	503	503
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 35: Use Church Spiritually: keep versus church

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
insurance enrollment	−0.139	−0.020	−0.022	−0.062**	−0.054	−0.075***
	(0.149)	(0.067)	(0.032)	(0.025)	(0.060)	(0.026)
use_church_spiritually	−0.194					
	(0.150)					
insurance enrollment x use_church_spiritually	0.092					
	(0.172)					
church_reasons_teaching		−0.025				
		(0.051)				
insurance enrollment x church_reasons_teaching		−0.041				
		(0.070)				
church_reasons_moral_guidance			0.008			
			(0.023)			
insurance enrollment x church_reasons_moral_guidance			−0.064			
			(0.041)			
believes_spiritual_attack				−0.029		
				(0.037)		
insurance enrollment x believes_spiritual_attack				0.010		
				(0.049)		
believes_god_involved_in_finances					0.004	
					(0.036)	
insurance enrollment x believes_god_involved_in_finances					−0.002	
					(0.061)	
attended_prayercamp						−0.063**
						(0.029)
insurance enrollment x attended_prayercamp						0.055
						(0.038)
constant	0.815***	0.667***	0.642***	0.663***	0.644***	0.669***
	(0.155)	(0.091)	(0.077)	(0.082)	(0.075)	(0.079)
N	490	504	504	490	504	503
Individual controls	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 36: Use Church Spiritually: keep versus street

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
insurance enrollment	−0.113	−0.092	−0.054	−0.070**	−0.141	−0.074**
	(0.215)	(0.088)	(0.040)	(0.031)	(0.096)	(0.031)
use_church_spiritually	−0.068					
	(0.229)					
insurance enrollment x use_church_spiritually	0.042					
	(0.246)					
church_reasons_teaching		−0.024				
		(0.071)				
insurance enrollment x church_reasons_teaching		0.025				
		(0.093)				
church_reasons_moral_guidance			−0.010			
			(0.041)			
insurance enrollment x church_reasons_moral_guidance			−0.029			
			(0.051)			
believes_spiritual_attack				0.007		
				(0.044)		
insurance enrollment x believes_spiritual_attack				−0.036		
				(0.056)		
believes_god_involved_in_finances					−0.054	
					(0.047)	
insurance enrollment x believes_god_involved_in_finances					0.072	
					(0.091)	
attended_prayercamp						−0.020
						(0.041)
insurance enrollment x attended_prayercamp						0.013
						(0.055)
constant	0.630***	0.610***	0.591***	0.571***	0.643***	0.595***
	(0.221)	(0.102)	(0.082)	(0.080)	(0.087)	(0.083)
N	490	504	504	490	504	503
Individual controls	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 37: Use Church Spiritually: keep versus thanks

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
insurance enrollment	−0.168	−0.115	−0.035	−0.045	−0.076	−0.080***
	(0.186)	(0.085)	(0.035)	(0.028)	(0.067)	(0.027)
use_church_spiritually	−0.227					
	(0.190)					
insurance enrollment x use_church_spiritually	0.128					
	(0.219)					
church_reasons_teaching		−0.049				
		(0.057)				
insurance enrollment x church_reasons_teaching		0.071				
		(0.089)				
church_reasons_moral_guidance			0.006			
			(0.035)			
insurance enrollment x church_reasons_moral_guidance			−0.032			
			(0.049)			
believes_spiritual_attack				−0.008		
				(0.043)		
insurance enrollment x believes_spiritual_attack				−0.067		
				(0.057)		
believes_god_involved_in_finances					−0.041	
					(0.032)	
insurance enrollment x believes_god_involved_in_finances					0.023	
					(0.071)	
attended_prayercamp						−0.078**
						(0.034)
insurance enrollment x attended_prayercamp						0.077*
						(0.044)
constant	0.738***	0.596***	0.546***	0.554***	0.589***	0.574***
	(0.188)	(0.098)	(0.083)	(0.087)	(0.089)	(0.081)
N	490	504	504	490	504	503
Individual controls	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 38: Use Church Network: keep versus church

	Dependent variable:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
insurance enrollment	−0.013	−0.048**	−0.035	−0.045*	−0.049*	−0.052**	−0.042*
	(0.031)	(0.024)	(0.030)	(0.026)	(0.027)	(0.022)	(0.025)
use_church_network	0.055						
	(0.056)						
insurance enrollment x use_church_network	−0.218**						
	(0.103)						
help_financial_church_community		−0.006					
		(0.035)					
insurance enrollment x help_financial_church_community		−0.038					
		(0.053)					
business_with_church			−0.007				
			(0.026)				
insurance enrollment x business_with_church			−0.043				
			(0.047)				
received_assistance				−0.009			
				(0.038)			
insurance enrollment x received_assistance				−0.045			
				(0.052)			
makes_friends_in_church					−0.024		
					(0.042)		
insurance enrollment x makes_friends_in_church					−0.032		
					(0.065)		
church_reasons_welcoming_members						0.014	
						(0.039)	
insurance enrollment x						−0.021	
						(0.054)	
church_reasons_welcoming_members church_reasons_interesting_congregation							0.085*
							(0.048)
insurance enrollment x							−0.106
							(0.065)
church_reasons_interesting_congregation constant	0.642***	0.647***	0.649***	0.646***	0.651***	0.643***	0.638***
	(0.076)	(0.077)	(0.081)	(0.079)	(0.079)	(0.079)	(0.076)
N	503	504	504	503	504	504	504
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 39: Use Church Network: keep versus street

	Dependent variable:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
insurance enrollment	−0.025	−0.055**	−0.052	−0.052*	−0.048	−0.072**	−0.069**
	(0.036)	(0.028)	(0.033)	(0.031)	(0.030)	(0.028)	(0.028)
use_church_network	0.080						
	(0.089)						
insurance enrollment x use_church_network	−0.229*						
	(0.124)						
help_financial_church_community		0.007					
		(0.046)					
insurance enrollment x help_financial_church_community		−0.069					
		(0.056)					
business_with_church			−0.013				
			(0.029)				
insurance enrollment x business_with_church			−0.036				
			(0.048)				
received_assistance				0.023			
				(0.047)			
insurance enrollment x received_assistance				−0.073			
				(0.061)			
makes_friends_in_church					0.025		
					(0.045)		
insurance enrollment x makes_friends_in_church					−0.117*		
					(0.064)		
church_reasons_welcoming_members						0.009	
						(0.040)	
insurance enrollment x						0.012	
						(0.055)	
church_reasons_welcoming_members church_reasons_interesting_congregation							0.032
							(0.058)
insurance enrollment x							−0.005
							(0.070)
church_reasons_interesting_congregation constant	0.578***	0.583***	0.591***	0.584***	0.593***	0.584***	0.583***
	(0.079)	(0.078)	(0.080)	(0.079)	(0.081)	(0.082)	(0.080)
N	503	504	504	503	504	504	504
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

Table 40: Use Church Network: keep versus thanks

				Dependent variable:			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
insurance enrollment	−0.062*	−0.057**	−0.046	−0.033	−0.053*	−0.066**	−0.058**
	(0.032)	(0.026)	(0.032)	(0.028)	(0.028)	(0.026)	(0.025)
use_church_network	−0.062						
	(0.093)						
insurance enrollment x use_church_network	0.043						
	(0.117)						
help_financial_church_community		−0.002					
		(0.047)					
insurance enrollment x help_financial_church_community		0.022					
		(0.059)					
business_with_church			−0.004				
			(0.029)				
insurance enrollment x business_with_church			−0.013				
			(0.044)				
received_assistance				0.034			
				(0.045)			
insurance enrollment x received_assistance				−0.081			
				(0.057)			
makes_friends_in_church					−0.056		
					(0.038)		
insurance enrollment x makes_friends_in_church					0.008		
					(0.062)		
church_reasons_welcoming_members						−0.051	
						(0.046)	
insurance enrollment x						0.073	
						(0.052)	
church_reasons_welcoming_members church_reasons_interesting_congregation							0.002
							(0.057)
insurance enrollment x							0.041
							(0.068)
church_reasons_interesting_congregation constant	0.560***	0.552***	0.551***	0.545***	0.554***	0.567***	0.549***
	(0.085)	(0.084)	(0.084)	(0.084)	(0.081)	(0.086)	(0.084)
N	503	504	504	503	504	504	504
Individual controls	YES	YES	YES	YES	YES	YES	YES
Church dummies	YES	YES	YES	YES	YES	YES	YES

Notes: *p<0.1; **p<0.05; ***p<0.01. Tobit regressions censored at 0 and 1. Standard errors are in parentheses below the estimates and are clustered at the session level. Dependent variable is the fraction of the endowment that a participant allocated to either their own church (columns 1 and 2), a nonprofit charity working with street children (columns 3 and 4) or a country-wide prayer event called the national day of thanksgiving (columns 5 and 6). The endowment in Wave 1 was 11 GHS in 2015 and the endowment in Wave 2 was 19 GHS in 2019. Individual controls include age, gender ethnicity, employment, log(income), an indicator for daily church attendance, an indicator for praying multiple times per day, church fixed effects, and a dummy for the experimental wave. The size of the sample changes across columns because a computer error led to some missing demographic variables in wave 1.

10 Appendix D: Model details

10.1 Setup

We assume that a church member has an income of Y and chooses to give an amount g to the church. The church member enjoys utility $u(.)$ from consuming secular goods, and utility $\theta f(.)$ from consuming church goods. Thus a church member who gives g to the church enjoys a total utility of $u(Y - g) + \theta f(g)$. Both utility functions are concave, thrice differentiable, and increasing in their arguments. In each period church members face a probability π of an income loss of size D.

Under the assumption that insurance is offered through the church community, church giving also has the impact of reducing the size of the loss, thus the total loss would be $D - l(g)$. The function $l(g)$ is assumed to be increasing and concave. Under the assumption that church members believe in spiritual insurance, this probability is decomposed into a basic probability of loss $\tilde{\pi}$, and a portion of the loss that can be mitigated by giving money to spiritual goods. Therefore, the total subjective probability of giving is $\pi = \tilde{\pi} - p(g)$. The function $p(g)$ is assumed to be increasing and concave.

10.2 Optimal giving to the church in the absence of any insurance

In this section we assume that church members choose a particular level of giving to maximise their total expected utility. There is no insurance offered through the church.

$$\max_{g} \quad (1 - \pi)u(Y - g) + \pi u(Y - g - D) + \theta f(g) \tag{7}$$

This leads to the following first order condition:

$$(\pi - 1)u'(Y - g) - \pi u'(Y - g - D) + \theta f'(g) = 0 \tag{8}$$

The second order condition is satisfied:

$$(1 - \pi)u''(Y - g) + \pi u''(Y - g - D) + \theta f''(g) < 0$$

To determine how optimal giving varies with D the size of the loss, we rewrite the FOC in terms

of $g^*(D, \theta)$,

$$(\pi - 1)u'(Y - g^*(D, \theta)) - \pi u'(Y - g^*(D, \theta) - D) + \theta f'(g^*(D, \theta)) = 0 \tag{9}$$

This equation implicitly defines the optimal giving g^*, which is a function of the expected loss D and θ.

We want to know the impact of experimentally manipulating D on the level of giving of individuals, in other terms the sign of $\dfrac{\partial g^*(D, \theta)}{\partial D}$.

Let $g_D^{*'}(D, \theta) = \dfrac{\partial g^*(D, \theta)}{\partial D}$. Taking the derivative of the FOC with respect to D leads to the following equality:

$$g_D^{*'}(D, \theta) * [\pi[u''(Y - g^* - D) - u''(Y - g^*)] + u''(Y - g^*) + \theta f''(g^*)] = -\pi u''(Y - g^* - D) \tag{10}$$

The right-hand side of the expression is *positive*. Each individual term of the expression multiplied by $g_D^{*'}$ is *negative*. Therefore $g_D^{*'}$ must also be *negative*.

Let us call $g_\theta^{*'} = \dfrac{\partial g^*(D, \theta)}{\partial \theta}$. We can also show that $g_\theta^{*'}$ is positive: a positive shock on the utility from consuming church goods increases church donations. Taking the derivative of the FOC with respect to θ leads to the following equality:

$$g_\theta^{*'}(D, \theta) * [(1 - \pi)u''(Y - g^*) + \pi u''(Y - g^* - D) + \theta f''(g^*)] = -f'(g^*) \tag{11}$$

The right-hand side of the expression is *negative*. Each individual term of the expression multiplied by $g_\theta^{*'}$ is *negative*. Therefore $g_\theta^{*'}$ is *positive*.

10.3 Community insurance: optimal giving when giving reduces the size of a loss

In this section we assume that giving to church reduces the size of the loss. $L = D - l(g)$ This assumption illustrates the channel of community insurance.

$$\max_{g} \quad (1 - \pi)u(Y - g) + \pi u(Y - g - D + l(g)) + \theta f(g) \tag{12}$$

This leads to the following first order condition:

$$(\pi - 1)u'(Y - g) + \pi(-1 + l'(g))u'(Y - g - D + l(g)) + \theta f'(g) = 0 \tag{13}$$

The secod order condition is satisfied:

$$(1 - \pi)u''(Y - g) + \pi l''(g)u'(Y - g - D + l(g)) + \pi(l'(g) - 1)^2 u''(Y - g - D + l(g)) + \theta f''(g) < 0$$

Rewriting the FOC in terms of $g^*(D, \theta)$:

$$(\pi - 1)u'(Y - g^*(D, \theta))) + \pi(-1 + l'(g^*(D, \theta)))u'(Y - g^*(D, \theta) - D + l(g^*(D, \theta)))$$
$$+ \theta f'(g^*(D, \theta))) = 0 \tag{14}$$

Taking the derivative of the FOC with respect to D leads to the following equality:

$$g_D^{*'} * [(1 - \pi)u''(Y - g^*) + \pi(l'(g^*) - 1)^2 u''(Y - g^* - D + l(g^*))$$
$$+ \pi l''(g^*)u'(Y - g - D + l(g^*)) + \theta f''(g^*)] = \pi(l'(g^*) - 1)u''(Y - g^* - D + l(g)) \tag{15}$$

On the right-hand side $u''(Y - g^* - D + l(g))$ is always *negative* while the expression multiplied by $g_D^{*'}$ of the left-hand side is also always *negative*. Therefore the sign of $g_D^{*'}$ depends on $(l'(g^*) - 1)$.

This provides a relationship between the efficiency of community based insurance and the optimal response of giving.

$$g_D^{*'} > 0 \text{ when } l'(g^*) > 1, \text{ or } g^* < l'^{-1}(1) \tag{16}$$

and

$$g_D^{*'} \leq 0 \text{ when } l'(g^*) \leq 1, \text{ or } g^* \geq l'^{-1}(1) \tag{17}$$

These conditions tell us that for low levels of optimal giving, experimentally increasing the per-

ceived loss D will decrease optimal giving.

We show below that the variation in optimal giving g^* can be the result of a variation in θ. More particularly, we demonstrate that $g_\theta^{*'} > 0$. Taking the derivative of the FOC with respect to θ gives:

$$g_\theta^{*'} * [(1 - \pi)u''(Y - g^*) + \pi l''(g^*)u'(Y - g^* - D + l(g^*))$$
$$+ \pi(-1 + l'(g^*))^2 u''(Y - g^* - D + l(g^*)) + \theta f''(g^*)] = -f'(g^*) \quad (18)$$

The right-hand side of the expression is *negative*. Each individual term of the expression multiplied by $g_\theta^{*'}$ is *negative*. Therefore $g_\theta^{*'}$ is *positive*.

Therefore our model predicts that there exist a threshold level for θ that will trigger a switch in the sign of $g_D^{*'}$.

Numerical illustration   Graphs 4 and 5 illustrate a numerical example, in which we simulate the case of $g_D^{'*}(D, \theta)$ changing sign around the threshold $\tilde{\theta}$.

This example uses a CARA utility function ($u(c) = 1 - exp(-ac)$), and assumes that $l(g) = s\,log(1 + g)$. The parameters D, s are chosen such that $D - l(g) \geq 0$. Figure 4 shows that the optimal giving $g^*(D, \theta)$ is increasing in θ while Figure 5 indicates that $g^*(D, \theta)$ is an increasing function of D until the threshold $\tilde{\theta} = 0.345$.

10.4   Spiritual insurance: optimal giving when giving reduces the subjective probability of a loss

In this section we assume that giving reduces the size of the loss. $\pi = \tilde{\pi} - p(g)$ This assumption illustrates the channel of spiritual insurance.

$$\max_g \quad (1 - \tilde{\pi} + p(g))u(Y - g) + (\tilde{\pi} - p(g))u(Y - g - D) + \theta f(g) \quad (19)$$

Figure 4: Community insurance - Numerical example: $Y = 10$, $D = 8$, $\pi = 0.4$, $u(.)$ CARA with $a = 0.1$, $f(.)$ CARA with $a = 1$, and $l(.)$ a logarithmic function with $s = 3.5$
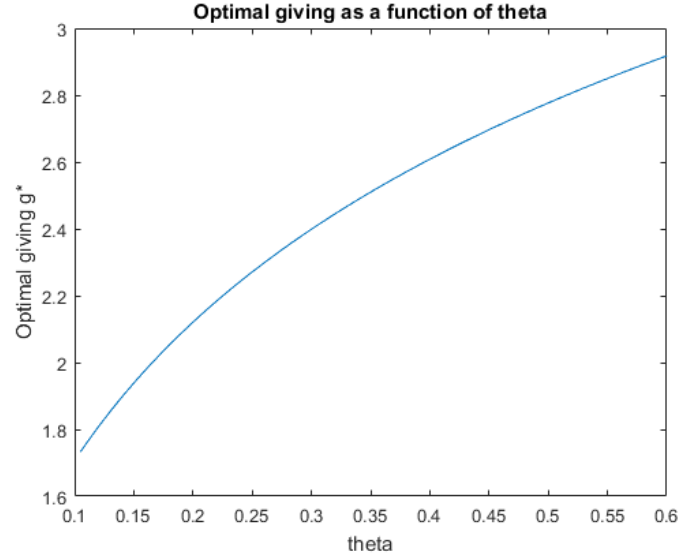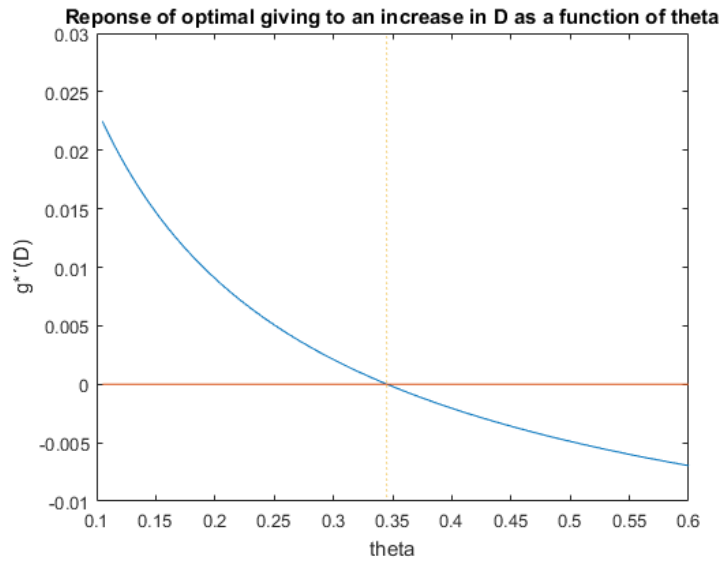

Figure 5: Community insurance - $g^{*'}(D)$ as a function of θ - numerical example marking the threshold $\tilde{\theta}$ where the sign of $g^{*'}(D)$ changes from positive to negative

This leads to the following first order condition:

$$p'(g)u(Y-g) - (1-\tilde{\pi}+p(g))u'(Y-g) - p'(g)u(Y-g-D) - (\tilde{\pi}-p(g))u'(Y-g-D) + \theta f'(g) = 0 \quad (20)$$

Taking the second derivative of the objective function leads to:

$$p''(g)(u(Y-g) - u(Y-g-D)) + 2p'(g)(u'(Y-g-D) - u'(Y-g)) +$$
$$(1-\tilde{\pi}+p(g))u''(Y-g) + (\tilde{\pi}-p(g))u''(Y-g-D) + \theta f''(g) \quad (21)$$

The first, third, fourth, and fifth terms are negative. The second term is positive. Intuitively, this expression is negative and the SOC is satisfied if the effect of the loss on the marginal utility of income not be too large. In other words, the income effect of the loss on the demand for insurance should not outweigh the substitution effect.

This condition is not too demanding. For example, it is satisfied in the numerical simulation shown below, where u is a CARA utility function: $u(c) = 1 - e^{-ac}$. Indeed, in this case,

$$p''(g)(u(Y-g) - u(Y-g-D)) + 2p'(g)(u'(Y-g-D) - u'(Y-g)) +$$
$$(1-\tilde{\pi}+p(g))u''(Y-g) + (\tilde{\pi}-p(g))u''(Y-g-D) + \theta f''(g)$$
$$= [p''(g) + 2ap'(g)) - a^2(\tilde{\pi}-p(g))](e^{(-a(Y-g-D))} - e^{(-a(Y-g))}) - a^2 e^{(-a(Y-g))} + \theta f''(g) \quad (22)$$

A sufficient condition for this expression to be negative is thus given by

$$p''(g) + 2ap'(g) - a^2(\tilde{\pi}-p(g)) \leq 0$$

With $p(g) = k\log(1+g)$ as in the numerical example below, this is equivalent to

$$k \leq \frac{\tilde{\pi}}{\frac{2}{a(1+g)} - \frac{1}{a^2(1+g)^2} + \log(1+g)}$$

This condition holds for example in the simulation below, where $Y = 10$, $D = 8$, $\tilde{\pi} = 0.4$, $a = 0.1$ and $k = 0.09$.

In order to determine how optimal giving varies with D the size of the loss, we rewrite the FOC

in terms of $g^*(D, \theta)$,

$$p'(g^*(D, \theta))u(Y - g^*(D, \theta)) - (1 - \tilde{\pi} + p(g^*(D, \theta)))u'(Y - g^*(D, \theta)) -$$

$$p'(g^*(D, \theta))u(Y - g^*(D, \theta) - D) - (\tilde{\pi} - p(g^*(D, \theta)))u'(Y - g^*(D, \theta) - D) + \theta f'(g^*(D, \theta)) = 0 \quad (23)$$

Taking the derivative of the FOC with respect to D leads to the following equality:

$$g_D^{*'} * [p''(g^*)[u(Y - g^*) - u(Y - g^* - D)] + 2p'(g^*)[u'(Y - g^* - D) - u'(Y - g^*)]$$

$$+ (\tilde{\pi} - p(g^*))[u''(Y - g^* - D) - u''(Y - g^*)] + u''(Y - g^*) + f''(g)]$$

$$= -[p'(g^*)u'(Y - g * -D) + (\tilde{\pi} - p(g))u''(Y - g^* - D)] \quad (24)$$

Therefore, we have the following conditions:

$$g_D^{*'} > 0 \text{ when } -[p'(g^*)u'(Y - g * -D) + (\tilde{\pi} - p(g))u''(Y - g^* - D)] < 0 \quad (25)$$

$$g_D^{*'} < 0 \text{ when } -[p'(g^*)u'(Y - g * -D) + (\tilde{\pi} - p(g))u''(Y - g^* - D)] > 0 \quad (26)$$

Numerical illustration We simplify these conditions using a CARA utility function: $u(c) = 1 - e^{-ac}$, $u'(c) = ae^{-ac}$, $u''(c) = -a^2 e^{-ac}$ and the risk aversion $R(c) = -\dfrac{u''(c)}{u'(c)} = a$

$$-p'(g) - (\pi - p(g))\frac{u''(Y - g - D)}{u'(Y - g - D)} = -p'(g) + (\tilde{\pi} - p(g))a \quad (27)$$

Therefore:

$$g_D^{*'} > 0 \text{ when } -p'(g^*) + (\tilde{\pi} - p(g^*))a < 0 \quad (28)$$

$$g_D^{*'} < 0 \text{ when } -p'(g^*) + (\tilde{\pi} - p(g^*))a > 0 \quad (29)$$

which can be rewritten as:

$$g_D^{*'} > 0 \text{ when } \frac{1}{a} p'(g^*) > (\tilde{\pi} - p(g^*)) \tag{30}$$

$$g_D^{*'} < 0 \text{ when } \frac{1}{a} p'(g^*) < (\tilde{\pi} - p(g^*)) \tag{31}$$

Therefore, we find that $g_D^{*'}$ is positive when the effectiveness of the spiritual insurance divided by the coefficient of absolute risk aversion at g^* is greater than the level of risk at g^*.

We can now also derive the conditions under which $g_D^{*'}$ is increasing until a certain level, and then decreasing. For this, we use the following reformulation of conditions (32) and (33):

$$g_D^{*'} > 0 \text{ when } p'(g^*) + ap(g^*) > a\tilde{\pi} \tag{32}$$

$$g_D^{*'} < 0 \text{ when } p'(g^*) + ap(g^*) < a\tilde{\pi} \tag{33}$$

Let us define $\Gamma(g) = p'(g) + ap(g)$. For $g_D^{*'}$ to be first positive and then negative we need $\Gamma(g)$ to be decreasing:

$$g_D^{*'} > 0 \text{ when } g^* < \Gamma^{-1}(a\pi) \tag{34}$$

$$g_D^{*'} < 0 \text{ when } g^* > \Gamma^{-1}(a\pi) \tag{35}$$

In order for Γ' to be decreasing, we need the following condition to be true:

$$\Gamma'(g) \le 0 \Leftrightarrow p''(g) + ap'(g) \le 0 \tag{36}$$

In the following, we will use a parametrization of $p(g)$ that is concave, and an a such that condition (36) hold in order to illustrate that with an increase in the level of giving, due to a higher θ for example, the sign of $g_D^{*'}$ can reverse.

We know that g^* is a function of θ, and we will now show a numerical example that illustrates the possibility of $g_D^{*'}|_{g^*(\theta)}$ to be positive until $g^*(\tilde{\theta})$ and negative afterwards. We will use the a simple

Figure 6: Numerical example: $Y = 10$, $D = 8$, $\pi = 0.4$, $u(.)$ CARA with $a = 0.1$, $f(.)$ CARA with $a = 1$, and $p(.)$ a logarithmic function with $k = 0.09$
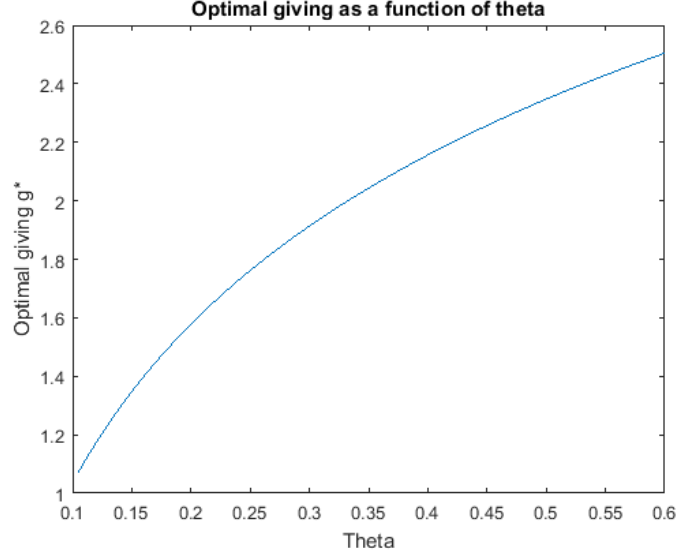
logarithmic function $p(g) = klog(g + 1)$ where $\tilde{\pi}$ and k are such that $0 < \tilde{\pi} - p(g) < 1$. If we insert this into equation (32), we get:
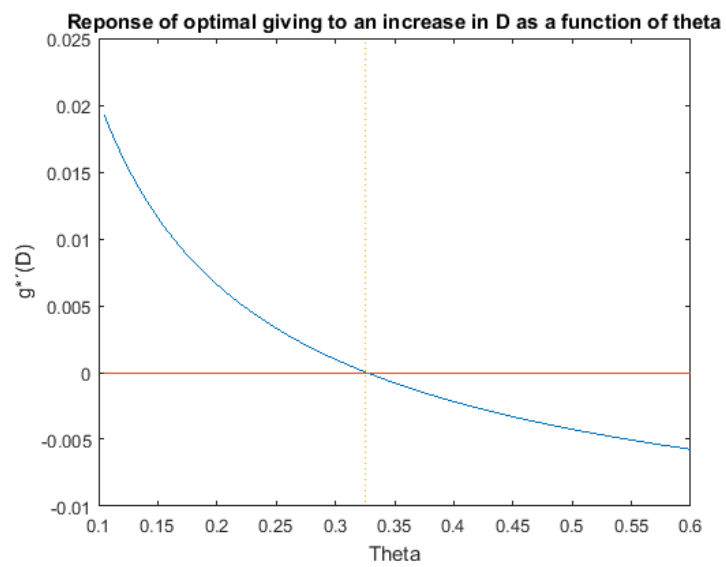
$$-\frac{k}{g^*(\theta) + 1} + (\tilde{\pi} - klog(g^*(\theta) + 1))a < 0 \tag{37}$$

Together with (33), we know that at a specific $\tilde{\theta}$, this equation is equal to zero:

$$-\frac{k}{g^*(\tilde{\theta}) + 1} + (\tilde{\pi} - klog(g^*(\tilde{\theta}) + 1))a = 0 \tag{38}$$

The following graphs illustrate a numerical example, in which we simulate the case of $g^*(\theta)$ being around the threshold in (38).

Figure 7: $g^{*'}(D)$ as a function of θ - numerical example marking the threshold $\tilde{\theta}$ where the sign of $g^{*'}(D)$ changes from positive to negative

11   Appendix E: Material

11.1   Questionnaire

1. How old are you?

   – number between 18 and 75

2. What is your gender?

   – Male
   – Female
   – prefer not to answer
   – do not know
   – not applicable

3. Where were you born?

   – Accra
   – Rural Ghana
   – Urban Ghana (not Accra)
   – Outside Ghana in Africa
   – Outside Africa
   – prefer not to answer
   – do not know
   – not applicable

4. How long have you lived in Accra?

   – Whole life
   – More than 10 years
   – 5 10 years
   – 2-5 years
   – Less than 2 years
   – prefer not to answer
   – do not know
   – not applicable

5. Are you married?

   – Yes
   – No
   – prefer not to answer
   – do not know
   – not applicable

6. What is the highest level of education you have completed?

   – No schooling
   – Primary
   – JHSS
   – SHS
   – Polytechnic

   – Professional degree
   – First degree
   – Advanced degree
   – prefer not to answer
   – do not know
   – not applicable

7. As an adult, have you ever left Ghana for more than 3 months for work or study?

   – Yes
     – Where did you go?
   – No
   – prefer not to answer
   – do not know
   – not applicable

8. What is your current work status?

   – Student
   – Unemployed or casual workers
   – Employed
   – Self-employed
   – Inactive(e.g. housewife)
   – Retired
   – prefer not to answer
   – do not know
   – not applicable

9. In which sector is your principal activity?

   – Unemployed
   – Student
   – Government
   – Agriculture
   – Services
   – Manufacturing or construction
   – Not-for-profit
   – prefer not to answer
   – do not know
   – not applicable

10. What is your principal source of income?

    – Salaried job
    – Entrepreneur
    – Family
    – Pension
    – Social support

- prefer not to answer
- do not know
- not applicable

11. How many people live in your household?

- number
- prefer not to answer
- do not know
- not applicable

12. Who usually makes the final financial decisions in your household?

- Me
- Spouse
- Parent
- Other senior relative
- Joint decisions incl. me
- Joint decisions not incl. me
- prefer not to answer
- do not know
- not applicable

13. How much do you earn on average per month in Ghana cedis?

- Less than 200
- 200 500
- 500-1000
- 1000-1500
- 1500-2000
- 2500-3000
- 3000-8000
- More than 8000
- prefer not to answer
- do not know
- not applicable

14. How much does your household earn on average per month in Ghana cedis?

- Less than 200
- 200 500
- 500-1000
- 1000-1500
- 1500-2000
- 2500-3000
- 3000-8000
- More than 8000
- prefer not to answer
- do not know

- not applicable

15. Are you responsible for the daily financial needs (not including any salary payments) of any of the following people other than yourself?

- Minor children
- Adult children
- Elderly parent
- Other family
- Other community member
- prefer not to answer
- do not know
- not applicable

16. How many people in each of the categories are you financially responsible for?

17. Which of the following expenses in you and your dependents' lives do you face on a regular monthly basis?

- Food
- Sickness(including medication costs, etc.)
- Transport
- Insurance
- Helping needy family members
- Church contribution
- Other social contribution (e.g. pledge to a school or charity)
- Investment in own business
- Investment in friend, relative, or business partner's business
- prefer not to answer
- do not know
- not applicable

18. How much do you spend each month in cedis on the particular expenses?

19. In the last year, was there a substantial, unexpected increase in any of these aspects of you and your dependant's lives?

- Food
- Sickness(including medication costs, etc.)
- Transport
- Insurance
- Helping needy family members
- Church contribution
- Other social contribution (e.g. pledge to a school or charity)
- Investment in own business
- Investment in friend, relative, or business partner's business
- I faced no unexpected expenses

- prefer not to answer
- do not know
- not applicable

20. How much did you spend to address the substantial increase?

21. What is your principal daily means of transport?
    - Privately owned car
    - Privately owned motorcycle
    - Trotro
    - Taxi
    - Bicycle
    - Foot
    - Train
    - prefer not to answer
    - do not know
    - not applicable

22. How many cellphones do you own?
    - number
    - prefer not to answer
    - do not know
    - not applicable

23. How many hours a week do you spend browsing the internet?
    - Less than 30 minutes
    - 30 minutes to 2 hours
    - 2 to 5 hours
    - 5-10 hours
    - More than 10 hours
    - prefer not to answer
    - do not know
    - not applicable

24. Do you own a business?
    - Yes
    - No
    - prefer not to answer
    - do not know
    - not applicable

25. How many years have you owned your business?
    - Less than 1 year
    - 1 3 years
    - 3 10 years
    - More than 10 years

- prefer not to answer
- do not know
- not applicable

26. How many employees do you have?
    - number
    - prefer not to answer
    - do not know
    - not applicable

27. Which religion do you belong to?
    - Pentecostal or charismatic Christian
    - Catholic Christian
    - Traditional
    - Protestant Christian
    - Muslim
    - No religion
    - prefer not to answer
    - do not know
    - not applicable

28. Were you born into this religion?
    - Yes
    - No
    - prefer not to answer
    - do not know
    - not applicable

29. Which denomination do you belong to? (Please specify a particular denomination, e.g. Action Chapel, ICGC, etc.)
    - name
    - prefer not to answer
    - do not know
    - not applicable

30. Do you belong to a different denomination than 5 years ago?
    - No
    - Yes,I changed within the last 5 years
    - Yes, I changed more than 5 years ago
    - prefer not to answer
    - do not know
    - not applicable

31. What are the main reasons you are with your current church?
    - The teaching about God corresponds to what I believe in
    - I go for the moral guidance to me and my family
    - I like the atmosphere of the services

- Friends or relatives brought me there
- Other members made an effort to welcome me
- The congregation contains many interesting and successful people
- I hope to meet a good marriage partner for me or my children
- The building is close to my home
- The facilities are comfortable (e.g. airconditioning, comfortable seating, etc.)
- prefer not to answer
- do not know
- not applicable

32. Are you engaged in any of the following ministries of your church?

    - Ushering or welcoming guests
    - Children's ministry
    - Worship team
    - Prayer ministry
    - Men or women's ministry
    - Youth ministry
    - Outreach
    - Deacon or deaconess
    - Protocol
    - Pastoring
    - prefer not to answer
    - do not know
    - not applicable

33. How many hours a week do you spend on each ministry? (preparation, participation, etc.)

34. Have you received financial assistance from your church in the last 5 years (incl. provisions)?

    - Yes
    - No
    - prefer not to answer
    - do not know
    - not applicable

35. How many times per week or per year do you attend your church?

    - Less than once a year
    - A few times per year
    - A few times per month
    - Weekly
    - More than once per week
    - prefer not to answer

- do not know
- not applicable

36. On average, how many hours do you spend each time you visit your church? (e.g duration of a service, prayer meeting, etc.)

    - Less than 1 hour
    - 1-2 hours
    - 2-3 hours
    - More than 3 hours
    - prefer not to answer
    - do not know
    - not applicable

37. How many hours do you travel (going and coming) to attend your regular church?

    - Less than 30minutes
    - 30minutes 1 hour
    - More than 1 hour
    - prefer not to answer
    - do not know
    - not applicable

38. Have you moved your place of residence in order to be closer to your church?

    - Yes
    - No
    - prefer not to answer
    - do not know
    - not applicable

39. In the last 6 weeks, have you engaged in any of the following activities to bring others to your church?

    - Preaching or teaching in the church
    - Preaching or teaching outside the church
    - Inviting friends or family to church
    - Distributing church material in public
    - Speaking or writing in public media (newspapers, radio, television, etc.)
    - Prayer
    - prefer not to answer
    - do not know
    - not applicable

40. How often do you pray to God?

    - Multiple times per day
    - Once per day
    - A few times per week
    - Occasionally
    - prefer not to answer

– do not know

– not applicable

41. Are there any foods you do not eat for religious reasons?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

42. Do you drink alcohol?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

43. Is this decision for religious reasons?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

44. Do you smoke tobacco?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

45. Is this decision for religious reasons?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

46. Do your religious beliefs affect the way you dress?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

47. Which of the following ceremonies have you done or would you do for your newborn child?

– Traditional naming

– Church blessing

– Baptism

– Outdooring party

– Nothing

– prefer not to answer

– do not know

– not applicable

48. What was the main cause of the most recent death in your extended family?

   – Accident

   – Illness

   – Violence

   – Old age

   – prefer not to answer

   – do not know

   – not applicable

49. Do you think there was spiritual element involved?

   – Yes

   – No

   – prefer not to answer

   – do not know

   – not applicable

50. How much on average do you give to the church per month?

   – Less than 5 cedis

   – 5 10 cedis

   – 11 50 cedis

   – 51 100 cedis

   – 101 200cedis

   – 201-500 cedis

   – More than 501 cedis

   – prefer not to answer

   – do not know

   – not applicable

51. Does giving to charity serve the same spiritual duty as giving directly to the church?

   – No, charity is more important

   – No, charity is less important

   – Yes, they are equally important

   – I do not think I have a duty to either.

   – prefer not to answer

   – do not know

   – not applicable

52. How is God involved in your finances?

- God leaves me to run my own financial affairs
- God provides enough that I do not suffer
- God blesses me with financial abundance
- God is not interested in my finances
- prefer not to answer
- do not know
- not applicable

53. Is it important for you that your close friends come from the same church as you?
    - Yes, I try to only make friends with people from my church or mosque
    - Yes, I try to seek people from my church or mosque but it is not so important
    - No, it is not important at all
    - No, I prefer not to be friends with people from my church or mosque
    - prefer not to answer
    - do not know
    - not applicable

54. Is it important for you that your coworkers come from the same church as you?
    - Yes, I only work with people from my church or mosque
    - Yes, I try to seek people from my church or mosque but it is not so important
    - No, it is not important at all
    - No, I prefer not to work with people from my church or mosque
    - prefer not to answer
    - do not know
    - not applicable

55. Do you try to do business with people from the same church as you?
    - Yes, I only work with people from my church
    - Yes, I try to seek people from my church but it is not so important
    - No, it is not important at all
    - No, I prefer not to work with people from my church or mosque
    - prefer not to answer
    - do not know
    - not applicable

56. Who do you call when you need counselling about personal or family issues?
    - No one

- Government or NGO social services
- Friends
- Family
- Pastor
- Imam
- Church member
- Work superior
- Medical professional
- prefer not to answer
- do not know
- not applicable

57. Who do you go to when you need financial help?
    - No one
    - Government or NGO social services
    - Friends
    - Family
    - Church community
    - Bank
    - Informal financial services (e.g susu group, moneylenders)
    - Work superior
    - prefer not to answer
    - do not know
    - not applicable

58. Who do you go to for medical support when you are sick?
    - No one
    - Government hospital
    - Private hospital
    - Traditional healer
    - Local clinic
    - Friends
    - Family
    - Pastor
    - Imam
    - Work superior
    - prefer not to answer
    - do not know
    - not applicable

59. Within the last 2 years, have you ever attended a prayer camp either for yourself or on behalf of a friend or family member?
    - Yes
    - No
    - prefer not to answer
    - do not know
    - not applicable

60. Which other clubs or associations are you an active member of?

    – name
    – prefer not to answer
    – do not know
    – not applicable

61. How did you meet your spouse if you are married? Where is the most likely place you will meet your spouse if you are not married?

    – Church
    – Through friends
    – Through family
    – Through work
    – Through school
    – Other social gathering
    – Internet
    – prefer not to answer
    – do not know
    – not applicable

62. Generally speaking, would you say other Ghanaians can be trusted?

    – People can almost always be trusted
    – People can usually be trusted
    – You usually cannot be too careful dealing with people
    – You always cannot be too careful dealing with people
    – prefer not to answer
    – do not know
    – not applicable

63. How much of the time do you trust the Ghanaian government?

    – I always trust the government
    – I mostly trust the government
    – I mostly mistrust the government
    – I always mistrust the government
    – prefer not to answer
    – do not know
    – not applicable

64. Are you registered for the National Health Insurance Scheme?

    – No
    – Yes
    – prefer not to answer
    – do not know

    – not applicable

65. Why not?

66. Do you hold any other sorts of insurance?

    – Yes
    – No
    – prefer not to answer
    – do not know
    – not applicable

67. Please specify which ones

    – name
    – prefer not to answer
    – do not know
    – not applicable

ADDITIONAL QUESTIONS FOR MARKET MEMBERS

68. Do you belong to the Kaneshie Markets Association?

    – Yes
    – No
    – prefer not to answer
    – do not know
    – not applicable

69. How many years have you belonged to the association?

    – number
    – prefer not to answer
    – do not know
    – not applicable

70. How many years have you paid your market dues?

    – number
    – prefer not to answer
    – do not know
    – not applicable

71. Have you ever met Auntie Eva, the market secretary?

    – Yes
    – No, but I know who she is
    – No, I have no idea who she is
    – prefer not to answer
    – do not know
    – not applicable

72. Have you ever received financial help from the market (loan, emergency money, help with stock, etc.)?

   – Yes, from the head of the market line
   – Yes, from the Kaneshie Market Association
   – Yes, from any other market members
   – No, I have received no help from the market

   – prefer not to answer
   – do not know
   – not applicable

73. Which market line do you belong to?

   – name
   – prefer not to answer
   – do not know
   – not applicable

11.2 Experimental protocol

Before participants arrive, enumerators prepare the room: they install chairs, tables, computers, and dividers. The session monitor prepares desks numbers to be given to participants, receipts, insurance forms, and envelopes for random draw. Enumerators sit and start the program while waiting for the participants.

When participants arrive, they are given an ID number and sit in front of a computer. The session monitor welcomes them and explains the experiment in English. One enumerator translates the explanations in the local language spoken by the participants (most often Twi).

Session monitor: *Welcome to our study, thank you for coming. We are a group of researcher from Toulouse in France and we are doing a study here in Ghana in collaboration with Central University College. The first part of the study consists in a questionnaire that contains demographic questions as well as questions about your religious practices. For completing the survey, you will receive 20GHS. The questionnaire is anonymous, no one will be able to associate you with the questionnaire. We will not record any private information with your answers. You are allowed to skip any question you do not want to answer. If you choose to stop the interview we will give you 5GHS for your effort to come here. In a second part, you will play a game on how to allocate 11GHS. You will be asked 10 questions; in each question you can choose you to allocate money between two different recipients. The list of the different recipients is written on the white board. First, in some occasions, you will have the opportunity to keep money for yourself. Another option will be to give money to the Streets Children Fund. This is an NGO active in Jamestown that helps children from the streets to access education. You will also be allowed to give to the National Thanksgiving Association, for a National Week of Prayer gathering as many Ghanaians as possible, from different religions, to pray for Ghana. This year the Week of prayer is expected to be held in March. You will also have the chance to make some donation to your own church privately, and in another option you can offer money to your church with your name. At the end of the game, we will pick one question randomly with equal probabilities. We will make payments according to your answers to this question. First, you will play a practice round, helped by your enumerator. You will play the real round privately. The session monitor is here to help you at any time. There are different types of sessions. The session we run with you is picked at random. We now ask you if you agree with us using the data from this session - the answers you give in the questionnaire and in the game which are anonymous - for research purpose.*

PAUSE, wait for objections. Continue if there are no objections. One participant draws an

envelope that contains the type of the session: 'INSURANCE, 'INSURANCE INFORMATION, or 'NO INSURANCE.

If the session is 'INSURANCE:

Session monitor: *The type of session we run with you is called 'INSURANCE. This means that we will offer you a funeral insurance policy. This insurance scheme is offered on the market by Enterprise Life and we will purchase it for you. From the day we enroll your name and for one year, if you or one of your family members (to be designated) dies, a recipient will get money to finance the funeral expenses (1000GHS). You can choose to enroll with you one family member. It can be of your parents, one of your minor children, your wife or husband. They should be younger than 74. To cover you and a family member, this insurance costs annually 12.50GHS. This group insurance is coordinated by your church. The coordinator is your Pastor (name). At the end of the year, you can collectively decide to continue or not the insurance contract. Any claim should be addressed to your Pastor, he will receive money for you if anything happens. If you do not wish to be benefit from the insurance policy, please inform us.*

If the session is 'INSURANCE INFORMATION:

Monitor: *The type of session we run with you is called 'INSURANCE. This means that we will give you information about an insurance that you can decide to purchase for yourself. The insurance we would like to discuss with you is a funeral insurance offered by Enterprise Life: if you or one of your family members (to be designated) dies, a recipient will get money to finance the funeral expenses (1000GHS). You can choose to enroll with you one of your parents, one of your minor children, or your wife or husband. They should be younger than 74. To cover you and one family member, this insurance costs annually 12.50GHS. At the end of the year, you can collectively decide to continue or not the insurance contract. The coordinator for this group insurance could be your Pastor (name). Any claim would be addressed to him, he would receive money for you if anything happens. If you are interested in buying this insurance, please contact Pastor (name).*

For all the sessions:

Monitor: *The experiment is now about to start. Please remember that the answers that you will give will be anonymous and be kept secret. The enumerators are here to guide you through the survey and translate it if necessary. You can leave the experiment at any time and you will be paid a show-up fee of 5GHS.*

The participants answer the questionnaire with the help of enumerators. After answering the

questionnaire, participants in 'INSURANCE sessions fill in the insurance form. Then they proceed to the game, first a practice round helped by the enumerators, and then the real round by themselves. Once they have entered their choices for the 10 money allocation questions, the participants randomly pick a letter that corresponds to one question. The session monitor enters the letter in the computer to record total payment. Participants leave the room and wait to be called for payment.