Essays on Behavioral Economics: Experimental Evidence from Microinsurance

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Summary

The aim of this thesis is to understand economic and behavioral issues in microinsurance markets. Each of the four chapters contributes to a greater understanding of barriers to insurance take-up either from a demand or a supply side.

The first chapter, together with Martin Eling and Joan T. Schmit, provides an overview of the determinants of microinsurance demand. By reviewing 51 empirical papers published since the early 2000s, we identify 12 key determinants of microinsurance demand. Our results suggest that more research on the role of non-performance risk, trust, financial literacy, and informal risk sharing mechanisms would benefit the growth of microinsurance markets. In the second chapter, jointly written with Christian Biener, Martin Eling, and Andreas Landmann, we examine the potential of social groups to address ex-ante moral hazard. Ex-ante moral hazard leads to substantial social welfare losses, and in its most extreme form, can lead to the failure of insurance markets. We make use of innovative field and computer laboratory experiments to show that pro-social preferences under group insurance scheme alleviate ex-ante moral hazard.

In the third chapter, Christian Biener and I exploit exogenous variation in exposure to Typhoon Haiyan to examine how large-scale shocks impact risk preferences and microinsurance demand. We find that individuals are more risk-loving after the typhoon. Moreover, take-up for individual insurance increases and take-up for group insurance decreases after the typhoon. The results suggest that large-scale shocks that affect entire communities render the mutual loss sharing aspect of group insurance less attractive. We apply the theory of salience to explain how individuals exhibit risk-loving behavior and yet buy insurance. In the final chapter, I evaluate how playing an experimental insurance game affects real-life insurance enrollment for the poor. I examine the long-term impact of an insurance game played in 2010 by conducting a follow-up survey in 2013. I find that those who participated in the game are significantly more likely to have enrolled in the country's social health insurance scheme. Drawing on insights from behavioral economics, particularly the role of emotions in financial decision-making and the role of behavioral policy interventions that help people overcome procrastination, I provide explanation for how the game might have impacted real-life insurance enrollment.

Zusammenfassung

Das Ziel dieser Arbeit ist es ökonomische, insbesondere verhaltensökonomische Fragen in Mikroversicherungsmärkten zu analysieren. Jedes der vier Kapitel trägt zu einem besseren Verständnis der Hindernisse bei der Versicherungsaufnahme, die auf der Nachfrage- oder Angebotsseite entstehen können, bei.

Das erste Kapitel, das in Koautorenschaft mit Martin Eling und Joan T. Schmit entstand, gibt einen Überblick über die Determinanten der Nachfrage nach Mikroversicherungen. Eine Durchsicht von 51 empirischen Arbeiten, die seit den frühen 2000er Jahren veröffentlicht wurden, ermittelt 12 Schlüsselfaktoren für die Nachfrage nach Mikroversicherungen. Unsere Ergebnisse legen nahe, dass mehr Forschung zur Rolle des Ausfallrisikos, des Vertrauens gegenüber den Produktanbietern, der finanziellen Allgemeinbildung und der informellen Risikoteilungsmechanismen notwendig ist, um Wachstumstreiber in Mikroversicherungsmärkten zu identifizieren. Im zweiten Kapitel, das in Koautorenschaft mit Christian Biener, Martin Eling und Andreas Landmann geschrieben ist, untersuchen wir das Potenzial sozialer Gruppen, um das Problem des ex-ante Moral Hazards zu adressieren. Ex-ante Moral Hazard führt zu erheblichen Wohlfahrtsverlusten und kann in seiner extremsten Form zum Zusammenbrechen von Versicherungsmärkten führen. Wir nutzen innovative Feld- und Computerlaborexperimente um zu zeigen, dass pro-soziale Präferenzen in einer Gruppenversicherung ex-ante Moral Hazard abschwächen können.

Im dritten Kapitel nutzen Christian Biener und ich eine exogene Variation in der Exposition gegenüber Typhoon „Haiyan“, um zu untersuchen, wie sich starke Schocks auf Risikopräferenzen und die Mikroversicherungsnachfrage auswirken. Wir zeigen, dass Menschen nach diesem Taifun risikofreudiger sind. Abgesehen davon steigt die Nachfrage nach Einzelversicherung im post-Typhoon Sample an, während die Nachfrage nach Gruppenversicherung sinkt. Die Ergebnisse legen nahe, dass starke Schocks, die sich auf ganze Gemeinden auswirken, den Aspekt des wechselseitigen Teilens von Verlusten, welcher Gruppenversicherungen kennzeichnet, unattraktiv machen. Wir wenden die Theorie der Salienz an, um zu erklären, warum Individuen, die ein risikofreudiges Verhalten aufweisen, Versicherungen kaufen. Im abschliessenden Kapitel, untersuche ich, wie die Teilnahme an einem experimentellen Versicherungsspiel die Aufnahme von Versicherungen von einkommensschwachen Menschen im realen Leben beeinflusst. Ich untersuche die langfristigen Auswirkungen eines im Jahr 2010 gespielten Versicherungsspiel mit Hilfe einer Folgebefragung im

Jahr 2013. Die Ergebnisse zeigen, dass diejenigen, die an diesem Spiel teilgenommen haben, sich deutlich häufiger für die Krankenversicherung des Landes registriert haben. Gestützt auf Erkenntnissen der Verhaltensökonomie, insbesondere über die Rolle von Emotionen bei finanziellen Entscheidungen und über die Rolle von Politikinterventionen, die Individuen helfen, zeitliche Aufschübe zu überwinden, biete ich Erklärungsansätze, wie sich dieses Spiel auf die reale Versicherungsaufnahme ausgewirkt haben könnte.

Chapter 1

Introduction

This thesis consists of four essays on behavioral economics, with experimental evidence from the field of microinsurance. The aim of this thesis is to understand the determinants of microinsurance demand using experimental research methods. The first chapter provides a broad overview of the literature on microinsurance demand whereas the remaining three chapters are concerned with demand and behavioral responses to microinsurance. The last three chapters are experimental studies that are united by the common aim of identifying causal relationships i.e., whether a particular program or intervention leads to the outcomes of interest. They also share a common setting in the rural Philippines. Ultimately, the goal of the studies undertaken is to inform policies and programs aimed at making microinsurance more accessible to the poor.

The first chapter, co-authored with Martin Eling and Joan T. Schmit, provides an overview of the determinants of microinsurance demand. Microinsurance – insurance for low-income individuals and households – has come to be seen as a promising tool for managing risk for the poor, yet demand for it is relatively low. Research on microinsurance markets were, until relatively recently, limited mainly to practitioner-based field studies, which, although informative, were lacking in rigorous statistical analyses. In the past fifteen years, this field of research has grown tremendously, and a comprehensive study was needed not only to structure existing research but to identify research gaps as well. We accomplish this in the first chapter by reviewing 51 empirical papers published between 2000 and early 2014 and identify 12 key determinants of microinsurance demand. Moreover, we provide a comparison of microinsurance markets with traditional insurance markets, which allows us to identify gaps in research in both markets. Our results suggest that a greater understanding of the role of non-performance risk, trust, financial literacy, and informal risk sharing mechanisms would enable microinsurance markets to grow.

From the supply side as well there are numerous problems with insurability in the microinsurance markets arising from moral hazard, adverse selection, high transaction costs, and lack of data. The second chapter, jointly written with Christian Biener, Martin Eling, and Andreas Landmann, focuses on ex-ante moral hazard, which leads to substantial social welfare losses. In its most extreme form, such moral hazard leads to the failure of insurance markets. Existing empirical work on this topic has been

mostly limited to developed markets, and there is a gap in the analysis of mechanisms to address such hazard. While limiting insurance coverage or increasing insurance premiums might be acceptable solutions in developed markets, they tend to be problematic in microinsurance markets, where the target populations struggle with basic insurance concepts. We examine the potential of social groups to address ex-ante moral hazard, borrowing from the literature on microfinance where such groups have proven to be quite successful. Using innovative field and computer laboratory experiments, we show that pro-social preferences under group insurance scheme reduce ex-ante moral hazard. This result has significant implications for microinsurance contract design.

In the third chapter, together with Christian Biener, we exploit a natural experiment to assess how risk preferences and microinsurance demand responds to natural disasters. Previous literature on the economics of natural disasters reveal that shocks have a long-lasting impact on individuals' risk-taking behavior as well as their demand for insurance, however, the direction of this impact is not clear. In this paper, we exploit the exogenous variation in exposure as well as severity of exposure to Typhoon Haiyan (2013) – one of the strongest tropical cyclones ever to strike land – to investigate the impact of natural disasters on experimentally elicited risk preferences and insurance demand. We find that individuals are more risk-loving after the typhoon. Moreover, we find that take-up of individual insurance increases significantly and group insurance decreases significantly post-typhoon. The results for the risk-loving behavior and the demand for individual insurance can be reconciled using the theory of salience. The result for a decrease in take-up of group insurance can be rationalized in that large-scale disaster that affect entire communities render the mutual loss sharing aspect of group insurance less attractive.

The preceding two chapters employ field experiments in the rural Philippines to understand microinsurance demand and behavioral responses. Conducting field experiments to understand human behavior has become increasingly popular in economics research. The growth of field experiments in recent years has prompted the research question for the final paper.

The final chapter is a single-authored paper that evaluates how playing an experimental insurance game affects real-life insurance enrollment for the poor. It is not hard to imagine that participating in field experiments can induce behavioral change. Research in social cognition and marketing has shown that research processes can unconsciously affect beliefs, attitudes, goals, and behavior; simply completing

household surveys have been shown to affect subsequent behavioral change. To assess causal impact, I examine the long-term impact of a lab-in-the-field experiment in 2010 involving an insurance game by conducting a follow-up survey three years later in 2013. Participating in the insurance game significantly increases enrollment in the country's social health insurance scheme, particularly in the insurance scheme that is targeted towards the poorest 25% of the population. The role of emotions in financial decision-making and the role of behavioral policy interventions or "nudges", which help people overcome procrastination, are useful to help explain how participating in insurance games can impact real-life insurance enrollment.

Chapter 2

The Determinants of Microinsurance Demand

with Martin Eling and Joan T. Schmit[*]

Abstract

The purpose of this article is to structure the extant knowledge on the determinants of microinsurance demand and to identify particularly salient questions for future academic research in a manner that achieves several outcomes. First is to offer a specific economic structure to the review through use of Outreville's insurance demand framework. Second is to identify key questions that arise out of structuring the material in this way. In particular, we attempt to clarify the critical open questions in microinsurance demand through use of Outreville's framework. Third, through comparison with literature on traditional insurance demand, we identify opportunities to understand not only the microinsurance market better but also the traditional market. Enhanced understanding may lead to opportunities for reverse innovation; that is, methods to expand demand in the traditional market. To achieve these outcomes, we review the academic literature on microinsurance demand published between 2000 and early 2014. The review identifies 12 key factors affecting microinsurance demand: price, wealth, risk aversion, non-performance risk, trust and peer effects, religion, financial literacy, informal risk sharing, quality of service, risk exposure, age, and gender. We discuss the evidence on each of these 12 factors in the microinsurance market and also present evidence of each factor's relevance in the traditional market. The results suggest that research focused on the role of contract performance (including basis risk and quality), trust, financial literacy, and informal risk sharing mechanisms may be most fruitful in expanding microinsurance markets.

[*] This paper has been published in the *Geneva Papers on Risk and Insurance* (2014), 39: 224-263.

2.1 Introduction

Life is risky for the poor in developing countries. Illnesses, natural disasters, unemployment, and accidents affect this segment of the population more severely than others due to their lack of formal insurance and their limited social safety nets, among other reasons. Many rely on informal transfers from friends, families, and relatives; however, such transfers often are deficient compared to what is needed (Fafchamps and Lund, 2003). Both academics and practitioners view microinsurance as a promising means of managing risk for the poor, yet demand for it is relatively low (Cole et al., 2013; Giné et al., 2008; Jowett, 2003; Thornton et al., 2010).

Until relatively recently, the literature on microinsurance demand was comprised almost exclusively of practitioner-based field studies; only a few works were of a traditional academic nature, using large unbiased samples and employing rigorous statistical analyses. Since the early 2000s, however, the field has blossomed to the point where a detailed and structured accounting of what we know and, perhaps more importantly, what we do not know about microinsurance demand is needed to guide policy decisions as well as direct future research efforts.

The intent and contribution of this paper is to organize the extant knowledge on the determinants of microinsurance demand in a manner that extends prior work, especially recent reviews published by the ILO.[1] Specifically, we employ Outreville's insurance demand framework from a global perspective of empirical research in structuring the existing work on microinsurance.

Our review identifies 12 conditions that receive significant attention in the empirical academic literature associated with microinsurance demand. Using Outreville's (2013) insurance demand framework, we categorize these 12 characteristics into four factors: economic factors (price, wealth), social and cultural factors (risk aversion, non-performance risk, trust and peer effects, religion, financial literacy), structural factors (informal risk sharing, quality of service, risk exposure), and personal and demographic factors (age, gender).

A second contribution of this paper is its comparison of microinsurance markets with traditional insurance markets. Traditional insurance refers to insurance geared toward

[1] See, specifically, de Bock and Gelade (2012) and Matul et al. (2013). De Bock and Gelade (2012) provide a literature review that focuses on consumer comprehension, and how microinsurance demand is affected by credit availability, risk-sharing groups, and other substitutes for formal insurance. Matul et al. (2013) provide another practitioner-oriented review paper and debunk 10 myths of microinsurance demand. For example, they show that gender, age, and risk aversion do not affect demand significantly. Moreover, the second chapter of Morsink's (2012) dissertation provides an excellent review of theories about insurance demand and an analysis of demand determinants in empirical microinsurance demand studies.

moderate to high-income markets predominantly in developed countries that have an established insurance culture.[2] Several findings emerge from this comparison. First, while the influence of risk aversion in traditional markets is ambiguous, it is almost universally negative in the microinsurance domain. Various studies point to the importance of trust in the insurance provider as a major factor in this result, a factor that perhaps also explains the ambiguous results in the traditional market. Second, while price is negatively related to take-up in both markets, as expected, the literature suggests that price alone cannot account for the low take-up rates in the microinsurance market. Similarly, while wealth/income are positively related to take-up in both markets, lack of resources (referred to as credit or liquidity constraints) does not fully explain why the microinsurance market is not more robust. Moreover, informal risk-sharing mechanisms can have either a positive (Mobarak and Rosenzweig, 2012) or a negative (Jowett, 2003; Arnott and Stiglitz, 1991) effect on demand for microinsurance. Further study of all these characteristics is likely to improve both the traditional and the microinsurance markets.

This article is organized as follows. In the next sections, we present results from empirical analyses of the determinants of microinsurance demand, focusing on 12 key factors highlighted in the literature. We also present results on those factors from the literature on traditional insurance markets. In Section 2.7 we use these outcomes to identify particularly salient research questions for future considerations. Conclusions are presented in Section 2.8.

2.2 Determinants of (micro) insurance demand

As Outreville (2013) notes, insurance demand models typically use a standard consumer approach, incorporating the following influences into the demand model: insurance price, policyholder wealth and/or income, policy payout (or, perhaps, perceived payout, including the concept of credibility[3]), discount rates to address the time dimension between decision and result, and elements embedded in the individual's utility function. A variety of proxies have been used in the literature to measure these influences. Outreville (2013) provides a framework of four categories to summarize these proxies and results from the empirical literature on insurance demand: economic factors (generally, the price and wealth/income influences), social and cultural factors (which focus on utility functions), structural factors (underlying market conditions, including discount rates), and personal and demographic factors (representations of loss exposures).

[2] For a more comprehensive distinction between microinsurance and traditional insurance, see Lloyd's (2009).
[3] For an example of possible contract non-performance, see Doherty and Schlesinger (1990).

These same factors are expected to be relevant in the microinsurance market yet their actual influence, including magnitude and direction of the effect, are expected to differ in some instances because of variations in market conditions, such as: income/wealth levels, quality of legal and regulatory environments, education, financial literacy, availability of informal risk-sharing networks, quality of services, and exposure to risks.[4] As we discuss the empirical evidence associated with each key factor, we also will present evidence of similarities and differences found in the microinsurance market compared with the traditional insurance market. Such information ought to help focus future research.

Over the past 10 to 15 years, we have experienced a tremendous expansion of academic research on microinsurance markets (Biener and Eling, 2012). Indeed, we are now at the point where some of what we are learning in the microinsurance domain, such as the relevance of trust in generating demand, may shed some light on the traditional insurance market as well. Yet numerous unanswered questions remain, especially given the persistently low take-up rate of microinsurance around the globe, even when coverage is subsidized.[5] While it might be completely rational for households, especially when they are risk averse, not to demand insurance (Clarke, 2011a; Doherty and Schlesinger, 1990), many studies note that less microinsurance is purchased than expected or desired. One of the purposes of this paper is to discuss evidence from the literature regarding why people do and do not purchase microinsurance.

With the goal of advancing the field, we review studies on microinsurance demand covering the period from 2000 to early 2014. Our search and identification strategy followed Biener and Eling (2012)[6] with the purpose of ensuring that the studies included meet academic standards (the search strategy description is available upon request). This strategy resulted in the identification of 51 empirical papers that specifically analyze demand issues in microinsurance markets. A complete list of all studies categorized by type of insurance, country of research, research method, sample size, and journals/academic publications is given in Table 2.6 in Appendix A.

[4] It is our belief that the underlying theory is not different for microinsurance; rather, the influence of factors may be different. We therefore use the same model, with a focus on differences in underlying market conditions.
[5] The take-up rate of subsidized microinsurance products is also much lower than the take-up rate of subsidized insurance products in traditional insurance markets. See, e.g., Glauber (2004), who discusses take-up rates in the subsidized US crop insurance (the take up rate is 80%).
[6] See Biener and Eling (2012) for the exact methodology.

Based on Outreville's[7] (2013) categorization scheme, we identified 12 factors considered key determinants of microinsurance demand, which are listed in Table 2.1. Some variables, such as trust and peer effects, financial literacy, and quality of service, have not been considered explicitly in traditional markets, and some variables may be categorized differently.[8]

In the following discussion, we systematically review all factors listed in Table 2.1. We first present the results for microinsurance, then compare those results with evidence for traditional insurance markets. This is followed by discussion of possible reasons for differences between the two markets. We note the perhaps obvious relevance of undertaking research that incorporates the interconnectedness of various characteristics, rather than considering each factor individually. For instance, experience with insurance, which is affected by price, may play a role in trust, which in turn appears to affect take-up. These factors likely are relevant in the traditional insurance market as well, yet may not be as evident, perhaps due to far different socioeconomic conditions for insureds in that market. While possibly obvious, incorporating these interconnections is a challenge sometimes unmet.

2.3 Economic factors

1.3.1 Price of insurance (including transactions costs)

Evidence for microinsurance markets: In most circumstances, the price of insurance should be inversely related to demand, i.e., the lower the price, the higher the expected demand, all else equal.[9] Several studies estimate price sensitivity of microinsurance by randomizing discount vouchers or subsidies. Using just such a method, Cole et al. (2013) find significant price sensitivity for rainfall insurance demand in India—specifically, a 10 percent price decline increases the probability of take-up by 10.4–11.6 percent of the baseline take-up rate, indicating a price elasticity of 1.04–1.16. Mobarak and Rosenzweig (2012) find that a 50 percent price decline relative to the actuarial price increases the probability of take-up by 17.6 percentage points, suggesting a price elasticity of 0.44, a result strikingly similar to that of Karlan et al. (2012). Likewise, Dercon et al. (2012) find that reductions in price lead to significant effects on health insurance demand, with 20 percent discount vouchers leading to a 12 percentage point increase in probability of purchase, yielding a price elasticity of 0.6.

[7] We note, however, that Outreville's focus is on cross-national evaluations, which are more focussed on macro factors than on micro factors. Zietz (2003), in contrast, considers the literature on life insurance demand within specific markets, focussing on micro factors. We combine the efforts of both authors in constructing our categorization of the literature.
[8] For instance, Zietz (2003) considers religion under personal and demographic factors. Our categories are intended to be as consistent as possible with those of Outreville (2013). We also note that we refer to empirical studies, not theory papers such as Arnott and Stiglitz (1991).
[9] For a thorough discussion, see Mossin (1968), Ehrlich and Becker (1972), de Bock and Gelade (2012), and Morsink (2012).

Gaurav et al. (2011) test the effect of a money-back guarantee for a full refund of the insurance premium if the rainfall insurance policy fails to pay out and, surprisingly, find no effect on demand. The findings from the studies on price and microinsurance demand are summarized in Table 2.2.

While reducing the cost of microinsurance is likely to increase demand, overall take-up rates may remain low. Cole et al. (2013) find that even when prices are significantly below actuarially fair prices, fewer than half of households purchase rainfall insurance. Thornton et al. (2010) observe that randomized subsidies increase take-up of health insurance, yet only 30 percent of those awarded a six-month subsidy enroll in the plan. Some evidence suggests that lack of demand is associated with lack of experience with insurance. In response, Cole et al. (2013) recommend heavy initial subsidies. The influence of subsidies, however, may be perverse. Thornton et al. (2010), Fitzpatrick et al. (2011), and Bauchet (2013) find that retention rates drop significantly following expiration of subsidies, running counter to the notion that familiarity will improve results. Furthermore, some instances of subsidy use appear to break the informal support mechanisms (often referred to as 'solidarity') that existed before insurance products were introduced, exacerbating the situation (Latortue, 2006).

Most studies on insurance demand use premiums, in one form or another, as the 'price' variable but, in the 'real world', there are other transaction costs to buying insurance, such as the time and effort required for policy purchase/renewal and claim filing (De Bock and Gelade, 2012). Thornton et al. (2010) identify cost of time and effort as an important reason for choosing not to enroll in health insurance, even when it is subsidized. Allowing workers to sign up directly at their place of employment, rather than miss a day of work due to the process, led to a 30 percentage point higher take-up. Other studies on health insurance also identify distance to health care facility as an important determinant of insurance take-up and find a negative relationship between distance to health facility and insurance take-up (Schneider and Diop, 2004; Zhang et al., 2006). However, Dong et al. (2009) find that those who live farther away from a health facility were more likely to have insurance as they seemed to value the insurance more.

Several studies posit that microfinance institutions (MFI) could play a role in lowering such costs and thereby raise demand (Akotey et al., 2011; Tadesse and Brans, 2012). Whether this will be the case appears to depend on ease of access to the MFI location, trust in the MFI, and, sometimes, the ability to bundle credit with insurance purchases. Thornton et al. (2010) find a slight negative effect (5.4 percentage points) on

enrolment among participants assigned to an MFI rather than to a government agency. Qualitative data gathered through participant surveys suggest that administrative challenges in working with these particular MFIs may increase rather than decrease participant transaction costs. Other studies indicate that access to agents at work, the availability of periodic rather than lump-sum payments, and similar factors are relevant to demand (Akter et al., 2008).

Comparison with evidence for traditional insurance: As expected, price (and transaction costs) also affects traditional insurance demand.[10] Evidence from developed markets generally shows a price elasticity of demand for insurance of .2 to .4 (Marquis et al., 2004), which is lower than that observed in microinsurance markets. Moreover, transaction costs are also important barriers to enrolment in traditional markets. Low take-up rates of public health insurance in the United States, for instance, have been associated with burdensome transaction costs (Aizer, 2007; Baicker et al., 2012; Bansak and Raphael, 2006).

Price is a relative factor, however, and we anticipate that there will be significant differences between traditional and microinsurance markets in the matter of price. Although premiums are 'low' in the microinsurance market because of low policy limits and few covered perils, even this cost when compared with income and/or available assets may well be high for the target population. Furthermore, the portion of the premium associated with loss costs tends to be lower in microinsurance than in similar traditional insurance products, given the effect of fixed costs in setting premiums. To the extent that consumers are aware of these differences, one would expect lower demand in the microinsurance market as a result.

2.3.2 Wealth (access to credit/ liquidity) and income

Evidence for microinsurance markets: Several studies show a positive relationship between wealth and microinsurance purchase. The authors of these studies hypothesize that wealth provides higher levels of liquidity and/or access to credit so that the purchase of insurance is feasible. Access to credit refers to borrowing opportunities; liquidity refers to availability of assets beyond what is needed to cover basic household expenses. Giné et al. (2008) and Cole et al. (2013) find that wealthier households are more likely to purchase rainfall insurance. Huber (2012) also confirms a positive link between household wealth and demand for life insurance in Indonesia. Less-wealthy households are believed to have little to no margin for insurance

[10] See Babbel (1985); Browne and Kim (1993); and Mantis and Farmer (1968) for a more comprehensive review, see Zietz (2003).

purchase after paying for agricultural needs at the start of the growing season (which is also the time when insurance would need to be purchased) (Cole et al., 2013; Giné et al., 2008). These households may want insurance, but simply do not have the resources to buy insurance at the time when premiums are due.

The wealth effect in the microinsurance market, therefore, appears distinct from the effect in traditional markets, where wealth often translates into greater levels of potential loss, leading to more insurance being purchased. In microinsurance markets, wealth may be instead a signal of access to credit (and/or liquidity). *A priori* it is not clear whether the effect of access to credit on demand is positive or negative. On the one hand, households without access to credit have less ability to smooth consumption in case of a shock and they thus may place higher value on insurance as a means to reduce income volatility (Giné et al., 2008). Gollier's (2003) theoretical model follows this reasoning. On the other hand, households lacking access to credit may not have funds enough to buy insurance even though a shock may be more damaging to them than to households less constrained. Cole et al. (2013) find support for this second line of thought, observing that take-up increases by 140 percent when households are given enough cash to buy one policy. The authors speculate as to the effects on take-up of even higher levels of cash disbursement.

Access to credit/liquidity alone, however, will not necessarily raise microinsurance demand significantly. Clarke (2011a) shows that even for farmers who are not credit constrained and who are offered actuarially fair premiums, basis risk causes them to purchase less than full insurance. Other scholars, such as Ito and Kono (2010) and Karlan et al. (2012), find little or no effect of credit constraints on microinsurance demand. The literature dealing with the effect of access to credit/liquidity on microinsurance demand is summarized in Table 2.3. To address the problem of credit constraints, Liu and Myers (2012) propose an insurance design where farmers can delay payment of the premium until the end of the insured period; testing this empirically, Liu et al. (2013) find that insurance take-up is three times higher among those given the option to pay at the end of the insured period. The authors note that this effect on take-up rate could be driven by relaxing credit constraints or by mitigating trust deficit in insurance provider, as will be discussed in section 2.4.3 on trust.

We note the complex nature of the questions imbedded here. For instance, wealth and credit are not the same. Even liquidity and credit may represent distinct qualities. Furthermore, results are estimated to differ depending on underlying assumptions

regarding risk aversion, concavity of utility functions, and whether or not we follow prospect Theory or alternative economic theories. The questions, therefore, represent rich opportunities for further investigation and elaboration.[11]

Income also is expected to affect a household's ability to afford insurance, yet it is especially difficult to measure in societies where wage income is negligible and self-reported measures of income are likely to be unreliable (Morris et al., 2000). Studies that measure income's effect on demand find either a positive or no effect. Jutting (2003) observes that low income plays a key role in nonparticipation in a community-based health insurance scheme in rural Senegal; Fitzpatrick et al. (2011) and Thornton et al. (2010) find no effect of income on insurance take-up rates. These results may reflect the high degree of correlation between income and other household characteristics (Thornton et al., 2010).

Comparison with evidence for traditional insurance: Research on traditional insurance demand tends to consider wealth and income as proxies for loss potential. That is, the more wealth and/or income, the greater the potential loss and, therefore, the greater the demand for insurance. The opposite could be true, however, assuming decreasing relative risk aversion (Mossin, 1968). With decreasing relative risk aversion, the greater the wealth, the less the individual will be concerned over any specific potential shock. Since Mossin's significant work in 1968, numerous authors have considered the various theoretical arguments regarding the influence of wealth on insurance purchase. We focus on the empirical studies here.[12]

Both income and wealth are found to be relevant in traditional insurance markets. Outreville's (2013) review shows that greater levels of national income (and, in a few studies, wealth) are associated with higher insurance penetration rates. Because of multicollinearity issues, most studies include either income or wealth in the analysis, rather than both simultaneously.

Wealth appears to affect the microinsurance and traditional insurance markets differently, although the expected sign of the effect is positive in both cases. In the traditional market, wealth (and/or income) typically represents potential loss. The larger that potential loss, the higher the level of insurance purchased. As discussed above, an alternative hypothesis associates lower relative risk aversion with increasing wealth, but most empirical findings support the loss potential theory. Within

[11] We thank our reviewers for input on these questions.
[12] For a more comprehensive review, see Zietz (2003).

microinsurance markets, greater levels of wealth (and/or access to credit markets) provide a means to pay an insurance premium. Lower-income individuals may actually have a greater need for insurance than the more wealthy because of the relative influence of the same type of shock, but those with lower incomes may suffer resource constraints that make insurance purchase infeasible. Even so, resource constraints do not appear to fully explain the low take-up rates in emerging markets.

2.4 Social and cultural factors

2.4.1 Risk aversion

Evidence for microinsurance: In contrast with the predictions presented in Outreville (2013) (and of expected utility theory generally), studies in microinsurance markets show a negative association between risk aversion and demand. Giné et al. (2008) and Cole et al. (2013) (rainfall insurance in India), Kouame and Komenan (2012) (crop insurance in Cote D'Ivoire), and Giesbert et al. (2011) (life insurance in Ghana) find that more risk-averse households are less likely to purchase insurance. Risk aversion can be measured using lotteries such as Binswanger (1981) and Holt and Laury (2002) or through survey questions as in Giesbert et al. (2011).

Several possibilities have been proposed to explain the consistent observation that risk aversion and microinsurance purchase are negatively related. One is that most experimental studies measure risk aversion by using lotteries in which only gains or the status quo are possible. Several scholars test for the effect of omitting the loss domain, especially referencing prospect theory (Kahneman and Tversky, 1979). Ito and Kono (2010) find weak empirical support for the prospect theory contention that people tend toward risk loving in losses. Dercon et al. (2011) observe differences in risk attitudes across the two domains, but do not find those attitudes to be significant in regard to insurance purchase.

Other interpretations suggest that households view insurance as risky (Giné et al., 2008; Giesbert et al., 2011) or that potential insureds have a limited understanding of the product (Cole et al., 2013). Factors such as price uncertainty associated with crop insurance (Kouame and Komenan, 2012) and the possibility of non-performance, evident for example in basis risk associated with rainfall insurance (Clarke, 2011a), cause individuals to view insurance as risky. These factors are discussed further below.

Comparison with evidence for traditional insurance: Empirical evidence on the relationship between risk aversion and insurance demand in developed markets also is

ambiguous (Outreville, 2013; Zietz, 2003). Furthermore, Cardenas and Carpenter's (2008) literature review indicates no empirical evidence supporting the idea that poor people in developing countries have higher or lower risk aversion than richer people in developed countries.[13] We anticipate that some of what is being discovered in the microinsurance context will assist in understanding the relationship between risk aversion and insurance purchase decisions in the traditional markets.

2.4.2 Non-performance and basis risk

Evidence for microinsurance: As just noted, one explanation offered for the inverse relationship between risk aversion and microinsurance demand is the possibility of non-performance (Doherty and Schlesinger, 1990), including basis risk (Dercon et al., 2011) in microinsurance products. Dercon et al. (2011) observe that expectations of non-performance influence demand for microinsurance. Non-performance may arise from contract exclusions, insurer bankruptcy, and other factors. As Doherty and Schlesinger (1990) demonstrate theoretically, uncertainty regarding insurer performance adds another risk to the scenario (that is, an additional state of the world in which the policy as written would be expected to pay yet does not).

Basis risk, which can be significant in indexed crop coverage, is a special focus in some of the literature. Basis risk here refers to the situation when insurance payouts are not perfectly correlated with underlying losses. For instance, a farmer who purchases indexed crop insurance could receive payment even when crops are not damaged and, importantly, might be denied compensation even when crops are lost. Payment is related to some underlying condition, such as the level of rainfall, rather than actual loss experience. While basis risk might be perceived as non-performance that yields an additional state of the world, policyholders might instead perceive it simply as increased risk by adding upside and downside risk. The relationships, then, among factors affecting performance, basis risk, and trust are inherently linked while also possibly producing distinct effects. Non-performance, including that due to basis risk, is sometimes posited as a reason for distrusting insurance, which in turn affects demand. The issue of trust is considered below.

Clarke (2011a) demonstrates that low demand for insurance can be explained by risk aversion in the presence of basis risk. Similarly, in a test involving randomly placed rainfall gauges and offers of index insurance to Indian farmers, Mobarak and Rosenzweig (2012) find that for every kilometer increase in a farmer's perceived

[13] Note that the findings are highly contested. See, for example, Henrich et al. (2010), Tanaka et al. (2010), Harrison et al. (2010), and Delavande et al. (2011) for recent results.

distance from the weather station (a proxy of basis risk), demand falls by 6.4 percent. They assert that the distance to the rainfall station is unlikely to proxy for 'trust' itself, and conclude that basis risk is a separate issue that needs to be addressed when seeking higher microinsurance take-up rates.

In terms of reducing non-performance risk, reinsurers might play an important role in the microinsurance markets. Reinsurance gives microinsurance protection against insolvency, whereby the reinsurer pays all costs above the reinsurance threshold, limiting the microinsurer's risk of failure to below-threshold costs (Dror and Wiechers, 2006). From the demand perspective, we do not know of any studies assessing the impact of reinsurance on take-up rates, which might be an interesting area for future research.

Comparison with evidence for traditional insurance: In terms of contractual non-performance risk, Wakker et al. (1997) show that even a small probability that the client will not receive a payout has a negative impact on insurance demand in traditional markets. These results are consistent with evidence suggesting that insurers can extract higher prices by demonstrating lower default risk (Sommer, 1996). Moreover, the quality of the legal and regulatory environment has a significant effect on insurance markets in developed countries (Outreville, 2013). Lack of appropriate data, however, makes analysis of the legal and regulatory environment difficult; the few studies that have assessed the impact of legal environment on demand at the macro level in the traditional markets find it to be positive and significant (Outreville, 2013; Beck and Webb, 2003).

2.4.3 Trust and peer effects[14]

Evidence for microinsurance: A second aspect of 'non-performance' risk may manifest itself as lack of trust, an issue of potential importance throughout the globe, yet one that appears to be particularly relevant for emerging economies. Based on qualitative responses, Giné et al. (2008), Schneider (2005), and Basaza et al. (2008) note that trust in the insurance provider is a key determinant of insurance enrollment. Similarly, Cole et al. (2013) find that households in India do not fully trust or understand insurance, and that their demand is 36 percent higher when there is a recommended (i.e., trusted) insurance educator involved in the purchase process. Cai et al. (2009) and Zhang et al. (2006) find that lack of trust in government-subsidized insurance in China is a significant barrier to participation.

[14] Morsink's (2012) dissertation offers an extensive and useful discussion of trust, peer effects, and networks.

Trust in insurance contracts is especially relevant in environments with weak legal systems for enforcing payment of valid claims (Cole et al., 2013). In developing countries with weak rule of law, the implication is a negative impact on insurance demand (Outreville, 2013); however, we are unaware of any work empirically analyzing this relationship in the microinsurance context.

Several factors might contribute to building trust in insurance contracts and providers. Firstly, as clients must trust microinsurers to pay claims in the future, including when there are outlier costs (whose probability of occurring is low but not zero) that affect the microinsurer's survival, reinsurance provides a clear advantage to a microinsurance provider (Dror et al., 2005; Dror and Wiechers, 2006). As such, reinsurance might contribute to building trust in the microinsurance provider. Another way in which trust could be established is by changing the timing of the premium payment to the end of the insured period that allows clients to observe whether or not the insurer defaults before paying the insured. Liu et al. (2013) find that insurance take-up is three times higher among those given the option to pay at the end of the insured period. A third way in which trust might be built is by encouraging familiarity with insurance concepts and the product itself. Based on experiences of conducting insurance games, Patt et al. (2009, 2010) suggest that participatory games that teach farmers how insurance works also builds their trust in the product itself. Results from studies testing the effect of trust on microinsurance demand are summarized in Table 2.4.

Peer influence is sometimes related to trust. Morsink and Geurts (2011) find that clients of a typhoon-related microinsurance program in the Philippines rely on the claim payout experiences of trusted peers. Likewise, Karlan et al. (2012) find that demand for insurance increases not only when a farmer has himself or herself received an insurance payout, but also when others in the farmer's social network have received a payout. Cai et al. (2011) offer an extensive study of the influence of social networks, concluding that the combination of financial education and experiences with insurance payout have significant effects on insurance demand in both the short and medium term.

Several studies investigate the usefulness of social networks in disseminating insurance information. Giné et al. (2011) find that financial literacy materials are efficacious in encouraging take-up when farmers' social contacts are involved. In contrast, Dercon et al. (2012) assess the impact of peer referrals for health insurance

participation in Kenya and find that the referral incentive has a negative influence on insurance demand relative to the basic marketing treatment. The authors suggest that the negative impact of peer referrals may be due to distrust of insurance sales staff. Hence, trust in one's peers seems to be an important factor in their influence on demand.

Comparison with evidence for traditional insurance: There is some, albeit limited, evidence that peer effects are relevant for insurance decisions in the traditional market. Sorensen, for example, finds that there is some effect of co-workers' decisions on one's own decision to purchase health insurance in the United States (Sorensen, 2006).

2.4.4 Religion/ fatalism

Evidence for microinsurance: Religion sometimes is considered to be related to risk attitudes as well as to a sense of cohesion within a community. A related factor, 'fatalism', is a measure of the extent to which individuals view events as outside of their control. Gheyssens and Günther (2012) find that those with strong faith tend to rely more on God, resulting in more risk-taking. They study only risk aversion, however, not insurance demand; yet their results may have implications for insurance demand. Similarly, Cole et al. (2011) find that fatalism in India is associated with greater use of insurance, yet the study does not evaluate insurance demand specifically. In testing for group affiliation effects through advertisements that highlight one's similarity to or difference from others in terms of religion, Cole et al. (2013) find that such affiliations affect insurance demand. Morsink (2012) suggests that Cole et al.'s results demonstrating that faith or religious affiliation could be connected to insurance demand may work through their effect on trust as well as through the social networks themselves.

Comparison with evidence for traditional insurance: Various studies test for the effects of religion on risk attitudes in traditional markets. Some find only a small effect on risk aversion (Eisenhauer and Halek, 1999), while others find more robust results, with more religious people demonstrating higher levels of risk aversion (Bartke and Schwarze, 2008; Noussair et al., 2012). Several cross-country studies assess insurance demand in Islamic countries, finding a negative correlation between insurance demand and religion (Beck and Webb, 2003); Browne and Kim, 1993); Feyen et al., 2013). The effects of religion on risk attitudes and insurance demand is a fruitful area for future research.

2.4.5 Financial literacy

Evidence for microinsurance: Financial literacy is expected to increase insurance demand. A commonly used measurement is a set of questions developed by Lusardi and Mitchell (2006) that tests understanding of basic financial concepts such as interest rate compounding, inflation, and risk diversification. Giné et al. (2008) find that lack of product understanding is the most commonly cited reason for not purchasing insurance. Low financial literacy levels have been shown to be a significant determinant of low insurance take-up (Cole et al., 2013; Platteau and Ontiveros, 2013). Several studies find that financial literacy initiatives or trainings have a positive effect on microinsurance demand (Cai et al., 2011; Gaurav et al., 2011; Giné et al., 2011). Dercon et al. (2014) find a positive impact of their training on risk management and insurance and emphasize that content of such trainings matter, and Hill and Robles (2011) find that providing training to group leaders or risk-sharing groups is more effective than training randomly selected individuals. Other studies have explored the role of insurance games in improving understanding of microinsurance and found positive effects (Cai and Song, 2013; Norton et al., 2012; Patt et al., 2009, 2010).

A number of studies, however, question the link between financial literacy and demand. For example, in a study of Ethiopians, Clarke and Kalani (2012) find no impact of financial literacy on insurance demand. Furthermore, Dercon et al. (2012) (Kenya), Bonan et al. (2012) (Senegal), Cole et al. (2013) (India), and Schultz et al. (2013) (Ghana) all included either financial literacy modules or insurance education as part of their experiments. None of them observe an effect of these modules on insurance demand.

Cai et al. (2011) investigate various factors that could explain the mixed results, such as the influence of a key individual within a particular social network, the size of the social network as well as its density, and the influence of experience with actual insurance claims. We note as well that some of the underlying financial literacy measures are stronger than others.

Distinct from financial literacy, education has been posited as a relevant factor in insurance demand. While education has been used as a proxy for financial literacy when no other measure is available, the two are considered different from one another (Lusardi and Mitchell, 2006); in the context of financial risk-taking, Bayer et al. (2009) argue that financial knowledge is a more relevant measure than education in general. Empirical evidence suggests that the link between education and

microinsurance demand is ambiguous: some find that more educated respondents are more likely to take up insurance (Akter et al., 2008; Chen et al., 2013; Huber, 2012; Jehu-Appiah et al., 2012; Jowett, 2003); others find no significant association between education and insurance uptake once accounting for financial literacy (Cole et al., 2013; Giné et al., 2008). Recent papers also show a negative relationship between level of education and relative risk aversion (Lin, 2009). These results suggest that analysis of the interaction between level of education and risk aversion may prove relevant in studying microinsurance demand.

Comparison with evidence for traditional insurance: An extensive literature exists on the association between financial literacy and other financial services such as savings, retirement funds, and the like, but studies on its relationship with insurance demand in developed markets is limited. Nevertheless, the existing evidence indicates a positive association between financial literacy and insurance demand (Cappelletti et al., 2013; Hecht and Hanewald, 2010). Most of the empirical papers on developed insurance markets show a strong positive association between education and insurance demand (Truett and Truett, 1990; Li et al., 2007); however, some studies find no significant relation (Browne and Kim, 1993) and others find a negative effect (Zietz, 2003).[15] Various reasons for these results can be considered, including differences in rigor across educational systems, confounding effects of education with other factors such as income and wealth, and cultural aspects involving how education influences custom. Further study on both education and literacy is warranted.

2.5 Structural factors

2.5.1 Informal risk sharing

Evidence for microinsurance: Informal risk-sharing networks are an important part of coping with risk in developing countries (Fafchamps and Lund, 2003; Morduch, 1999). Furthermore, the level of informal risk-sharing in a social network can have a significant impact on demand for formal risk-sharing mechanisms such as insurance. In line with the Arnott and Stiglitz (1991) model that explains why informal risk sharing can have a negative effect on demand for formal indemnity insurance, Jowett (2003) finds that individuals living in highly interconnected communities in Vietnam are far less likely to purchase government health insurance, while those in disconnected communities are more likely to purchase coverage. The findings suggest that strong informal networks may crowd out government interventions. However, Cai et al. (2011) demonstrate that informal networks play an important role in extending

[15] For a comprehensive list of studies, see Zietz (2003).

insurance knowledge to the wider community. That knowledge, in turn, affects demand for formal insurance products, often in a positive direction. Landmann et al. (2012) conduct a controlled experiment to observe the influence of introducing formal insurance mechanisms on informal risk sharing (often referred to as 'solidarity'). They find that '[f]ormal insurance can be ineffective (e.g., when no saving device is available and solidarity is potentially high) or can be effective (e.g., when secret saving is possible and informal solidarity is limited)' (Landmann et al., 2012; p.6).

Mobarak and Rosenzweig (2012) explore the hypothesis that risk-sharing networks could actually complement index insurance in the presence of basis risk. They find that in communities with strong informal risk-sharing systems, index insurance can be attractive. When the formal indexed policy makes a payout, the payment appears to become a part of the community's perceived overall resources, and informal mechanisms then likely spread those payouts to the farmers who experienced the largest losses. Essentially, the community undertakes the administrative task of delivering the insurance payment to the individuals who suffered loss. As Mobarak and Rosenzweig (2012, p.1) indicate "Demand for index insurance is lower with greater basis risk, but indemnification of household-specific losses by the network mitigates this effect". Dercon et al. (2014) also find similar results that within-group risk-sharing and index insurance are complements.

Comparison with evidence for traditional insurance: The use of mutuals and cooperatives in the early stages of insurance market development, especially when mutuals were assessable,[16] was similar to today's informal risk-sharing systems in emerging economies. As assessable mutuals are now rare, perhaps social security systems are the closest relative to informal risk-sharing strategies. Social security is a means by which governments are able to provide (and enhance) the sort of intergenerational informal risk sharing previously common in agrarian societies. By providing protection against health, disability, and mortality risks, social security is expected to have a negative impact on demand for life and health insurance (Outreville, 2013). The empirical results are mixed,[17] however, with some studies finding positive results (Browne and Kim, 1993; Bernheim, 1991) and others finding negative ones (Rejda et al., 1987; Lewis, 1989).

The crowding out issue between formal and informal insurance mechanisms is an important one for microinsurance market development. To the extent that well-

[16] An assessable mutual is one in which the insurer is able to request additional contributions from the policyholders after conclusion of the policy contract period when full loss and cost information is available.
[17] For an extensive list of studies, see Zietz (2003).

functioning informal systems exist, caution is warranted in introducing insurance schemes that could be perceived as substitutes. Furthermore, developing a deeper understanding of the factors that foster success and prevent failure of informal systems will make future microinsurance efforts more sustainable.

2.5.2 Quality of service

Evidence for microinsurance: Various authors analyze the link between service/product quality and microinsurance demand. Each of these studies has focused on health insurance, a domain where tremendous variation exists in access to underlying high-quality services. These studies may relate to non-performance risk as discussed in section 2.4.2. We choose to separate the two for several reasons. First, non-performance generally relates to failure to pay a loss. For instance, a farmer who purchase indexed crop insurance may experience a loss yet not receive an insurance payment because of basis risk. This situation is not really about quality of underlying services; rather, it represents a challenge to the insurance industry in the type of product it offers. Second, health insurance is favorably viewed (Cohen et al., 2003; Mathauer et al., 2007) yet burdened by the lack of quality of services in many locations. Separating quality of service from other barriers in providing insurance, therefore, seems warranted for purposes of improving the market.

Among the papers addressing health insurance demand is De Allegri et al. (2006) who suggest that the decision to enroll in community-based health insurance in rural West Africa is closely linked to the quality of the health center. Basaza et al. (2008), Criel and Waelkens (2003) and Mathauer et al. (2007) find that poor-quality health care is an important reason for people not to join health insurance in Uganda, West Africa, and Kenya respectively. Dong et al. (2009) note that along with health needs and health demands, quality of care is an important factor in insurance drop-out. Jehu-Appiah et al. (2012) find that health care provider attitudes are important for households in deciding to enroll in the national health insurance scheme in Ghana. Similarly, Nguyen and Knowles (2010) find that demand for health insurance in Vietnam increases significantly with the expected benefits of insurance as measured by distance to and quality of a provincial hospital. Dror et al. (2007) also find that the range of services covered by health insurance is an important determinant of take-up. Taken together, this evidence suggests a clear, positive link between product quality and demand.

Comparison with evidence for traditional insurance: In developed markets, we observe some evidence that quality of care is an important determinant of health

insurance take-up. Specifically, Costa and Garcia (2003) find that quality of services (e.g., long waiting lists) explains the low demand for public health care in Spain, which provides universal access to health care. Given observations in the micro field, research on the role of quality in insurance demand more generally is an appropriate topic for future research.[18]

2.5.3 Risk exposure

Evidence for microinsurance: Several studies have investigated how risk exposure, particularly the effects of past shocks, affects demand for microinsurance. Past shocks can affect microinsurance demand in a number of ways. They might change people's beliefs about the probability or magnitude of a negative event, which would be expected to increase microinsurance demand. Alternatively, such shocks might affect people's ability to cope with loss by reducing the availability of assets to pay the premium, thereby decreasing microinsurance demand. The overall effect, therefore, is an empirical question.

Akter et al. (2008) consider the direct effect of risk exposure (as opposed to past shocks) on catastrophe insurance purchase decisions where risk exposure is measured as the likelihood of being struck by disaster (probability of exposure). They find that risk exposure has a significant positive impact on the insurance purchasing decision. Arun et al. (2012), however, find a significant negative relationship between the experience of a severe hazard other than severe illness or death of a household member and purchase of micro life insurance, indicating households' limited ability to purchase insurance after a shock. Ito and Kono (2010) also find that households with a sick household head are less likely to purchase insurance. In both cases, the authors suggest that insurance demand declines following a shock because resources also decline. They do not, however, have data to test this hypothesis directly. Contrastingly, Ito and Kono (2010) also find that households with a higher ratio of sick members were more likely to purchase insurance.

These results are similar to Giesbert et al. (2011) who find that households that consider themselves more exposed to risk than others are less likely to purchase insurance, although causality is not established. They note, however, that the underlying policy is perceived by the non-insured as presenting them with little value. In contrast, Arun and Bendig (2010) find that households that perceive themselves as more exposed to risk are more likely to use financial services, including insurance.

[18] We note that the issue considered by Costa and Garcia is complex, incorporating elements of voluntary health insurance, national universal coverage, waiting lists, adverse selection, and moral hazard.

In creating their subjective beliefs, individuals often use heuristics that lead to various results we might consider anomalies, yet can be explained through use of the heuristics. For example, the recency bias is a well-documented phenomenon in which individuals tend to overweight recent and severe events (Kahneman and Tversky, 1971). Cai and Song (2013) find evidence of a recency bias in that that the just-experienced hypothetical insurance game has a stronger effect on insurance take-up than do experiences with actual disasters a year or more ago. Karlan et al. (2012) also find results consistent with recency bias in that demand is positively related to receipt of a payout on an indexed rainfall policy in the prior period even though rainfall outcomes show no serial correlation. In contrast, Galarza and Carter (2010) find evidence of the opposite "hot-hand effect," which occurs when those experiencing many shocks tend to underestimate autocorrelation, thereby assuming better future results and opting for less insurance.

As in so many situations, then, the influence of loss experiences on risk perception and decisions to take-up insurance are complex and confounding.

Comparison with evidence for traditional insurance: In developed markets, evidence suggests that people are more likely to purchase insurance immediately after a loss, consistent with the notion of 'recency (or availability) bias' (Johnson et al., 1993; Kunreuther, 1996; Kunreuther and Pauly, 2005). Some researchers measure underlying exposures through general wealth indicators such as GDP, land resources, etc. These studies tend to find a positive relationship between underlying exposures and insurance purchase at the national level.[19] We do not know of studies researching individual wealth effects and insurance purchase, however, and this could prove a fruitful area of research for both microinsurance and traditional insurance.

2.6 Personal and demographic factors

2.6.1 Age

Evidence for microinsurance: Age has been included in many of the empirical studies of microinsurance demand, yet generally included as a control, rather than as a variable of particular interest. In some settings, such as life and health insurance, age likely represents loss exposure. In other settings, however, the influence may generate from risk attitudes and utility functions, as noted below in the literature on demand for traditional insurance. In the microinsurance literature to date, the results with regard to

[19] See Browne and Kim (1993) among others.

age have been ambiguous. Some studies find that age has a positive effect on demand (Cao and Zhang, 2012; Chen et al., 2013); others find a negative effect (Giné et al., 2008) or none (Cole et al., 2013). For life insurance, Arun et al. (2012) find no evidence of a life-cycle effect as take-up decreases with age (and increases after a certain point), which is in contrast with Giesbert et al. (2011) who note that take-up increases with age.

Comparison with evidence for traditional insurance: For traditional insurance markets, the effect of age on demand also is ambiguous, with studies finding a positive (Truett and Truett, 1990), negative (Bernheim, 1991; Chen et al., 2001), or no effect (Gandolfi and Miners, 1996). These results, however, may reflect the U-shaped relationship as identified in the Cohen and Einav (2007) and Halek and Eisenhauer (2001). Similar tests seem warranted in the microinsurance market.

2.6.2 Gender

Evidence for microinsurance: Risk attitudes of women have been perplexing to researchers for some time. The majority of, although certainly not all, research on the topic appears to demonstrate lower risk tolerance by women than men, even though the cause is unclear either theoretically or empirically (Borghans et al., 2009; Eckel and Grossman, 2008; Cohen and Einav, 2007).[20] Lower risk tolerance ought to translate into greater levels of insurance purchase. The evidence regarding gender and microinsurance take-up, however, is mixed. Studies show that households headed by women are more likely (Chankova et al., 2008; Nguyen and Knowles, 2010), as likely (Thornton et al., 2010), or less likely (Bonan et al., 2012; De Allegri et al., 2006) to enroll in insurance than households headed by men. We note as well, as discussed in section 2.4.1 on risk attitudes, that the microinsurance market seems to demonstrate ambiguous results with regard to risk aversion. The fact that women generally demonstrate greater risk aversion than men, therefore, might not translate into greater levels of insurance purchase because of the ambiguous relationship between risk aversion and insurance purchase decisions.

Comparison with evidence for traditional insurance: Similar results are observed in the traditional insurance markets. For example, Cohen and Einav (2007) and Halek and Eisenhauer (2001) both find greater risk aversion among women. Gandolfi and

[20] See Borghans et al. (2009); Eckel and Grossman (2008); Cohen and Einav (2007). Eckel and Grossman (2008) note that field studies often conclude that women are more risk averse than men, whereas laboratory experiment findings are less conclusive.

Miners (1996), however, observe that differences in purchase decisions of men and women depend on women's labor force participation.

2.7 Input to future research

Based on the above discussion of empirical findings regarding demand in both microinsurance and traditional insurance markets, we identify important areas for future research. To summarize what the literature offers in this regard, we present Table 2.5. The structure of Table 2.5 follows that of Outreville (2013) and Zietz (2003) who provide a comprehensive overview of factors affecting demand for traditional insurance, including life and property-liability insurance. The information shown in Table 2.5, therefore, extends beyond the factors already discussed (and shown in Table 2.1) because it incorporates factors not yet studied in the microinsurance domain. We note as well a few places where the literature on microinsurance demand has considered factors not yet tested in the traditional market. Our intention is to highlight areas where future research is likely fruitful, mostly focused on obtaining a better understanding of microinsurance demand, yet also recognizing opportunities to improve our understanding of demand in the traditional markets.

From Table 2.5 we observe a number of instances when results are ambiguous, where they differ between microinsurance and traditional markets, and where analyses have been done in one or the other market but not both. Here we discuss those areas we believe most fruitful for future research.

The study of microinsurance has revealed several key elements to heightened demand: trust, product understanding, financial literacy generally, informal risk sharing, and risk attitudes. We consider these factors each to affect and be affected by one another, given the existing empirical evidence.

Other than risk attitudes, these factors have not received attention in the traditional insurance markets. Analyses in developed markets may well offer input to improved product design and market operations in both the developed and developing economies.

We note as well that most of the structural factors, such as the legal environment, enforcement of property rights, along with specific market conditions such as concentration, presence of foreign insurers, and the existence of a robust banking sector, have not been studied in the microinsurance domain. Given the developing

nature of microinsurance, most of the literature on this market has used data from relatively small field studies rather than cross-national factors. As the microinsurance market matures, however, such global comparisons ought to become feasible and offer additional insight into public policy discussions of using insurance as a social safety net.

An interesting example comes from the fact that neither Outreville (2013) nor Zietz (2003) discuss the availability of reinsurance as a precondition for the development of insurance markets. Since publication of Dror and Preker's (2002) book on the role of social reinsurance in the establishment of microinsurance market, however, several papers have examined the role reinsurance plays in the availability and demand for microinsurance schemes (Bonnevay et al., 2002; Dror and Armstrong, 2006; Biener and Eling, 2012). We see, therefore, that not only are there variables from the traditional markets that have yet to be analyzed in a microinsurance context, but there are variables discussed in the microinsurance context that could be more closely analyzed for traditional markets.[21]

2.8 Conclusion

With the expansion of "micro" financial services products to low-income populations around the globe, academics have sought greater understanding of market experiences with these products. Much of the resulting research has focused on factors than enhance or impede product acquisition. In this paper, we focus on microinsurance, presenting results from the existing published academic literature and structuring it according to Outreville's (2013) economic framework. While the literature review reveals numerous relevant factors, a confluence of several overlapping conditions appear particularly relevant in explaining the relatively low demand for microinsurance to date: non-performance risk (including perhaps basis risk and service quality), trust, financial literacy, and the existence of informal risk sharing arrangements.

An interesting opportunity exists to study the implications of these factors not only within the microinsurance market but also in the traditional insurance market, and ultimately to compare the two for purposes of understanding both markets better. Some of the mixed evidence on risk aversion in the traditional insurance market, for instance, may arise from factors associated with trust and contract performance. By testing within the traditional market, we may understand better how to address demand

[21] Older work, such as Berger et al. (1992) and Lewis and Murdock (1996), discusses the link between reinsurance availability and insurance demand, especially in the context of the US liability crisis.

within the micro market. Particularly curious is the evidence that wealth and liquidity constraints do not appear to influence microinsurance purchase decisions. As some have suggested (cite), this may reflect contract performance and trust. Studies within traditional markets may help disentangle the various underlying factors, given generally greater access to data.

Economic research can offer support to regulatory bodies, aid agencies, insurers, and others as these agencies attempt to expand opportunities in low-income communities. As is observed in reading this review, a great deal of rich research is available to those agencies already. Our review is an attempt to assist in highlighting what we know to date and what we do not yet know. It also is intended to help identify the most fruitful areas for future research as we continue to try to understand underlying issues associated with (micro)insurance demand.

2.9 Tables

Table 2.1: Literature on determinants of microinsurance demand

Variables	Sign of determination		
	Positive	Negative	Non-significant
Economic factors			
1. Price of insurance		**Price of insurance** 1. Bauchet (2013) 2. Cole et al. (2013) 3. Dercon et al. (2012) 4. Fitzpatrick et al. (2011) 5. Karlan et al. (2012) 6. Mobarak and Rosenzweig (2012) 7. Thornton et al. (2010) **Transaction costs** 1. Akotey et al. (2011) 2. Dong et al. (2009) 3. Schneider and Diop (2004) 4. Tadesse and Brans (2012) 5. Thornton et al. (2010) 6. Zhang et al. (2006)	**Price of insurance** 1. Gaurav et al. (2011)
2. Income and Wealth (access to credit/ liquidity)	**Wealth (Access to credit/liquidity)** 1. Cole et al. (2013) 2. Giné et al. (2008) 3. Huber (2012) 4. Liu et al. (2013) **Income** 1. Jutting (2003)		**Access to credit** 1. Ito and Kono (2010) 2. Karlan et al. (2012) **Income** 1. Fitzpatrick et al. (2011) 2. Thornton et al. (2010)
Social and cultural factors			
3. Risk aversion	1. Ito and Kono (2010)	1. Cole et al. (2013) 2. Giné et al. (2008) 3. Giesbert et al. (2011) 4. Kouame and Komenan (2012)	1. Dercon et al. (2011)
4. Non-performance and basis risk		**Basis risk** 1. Mobarak and Rosenzweig (2012) 2. Dercon et al. (2011)	
5. Trust and peer effects	**Trust** 1. Basaza et al. (2008) 2. Cai et al. (2009) 3. Cole et al. (2013) 4. Dercon et al. (2011) 5. Giné et al. (2008) 6. Liu et al. (2013) 7. Schneider (2005) 8. Zhang et al. (2006) **Peer effects** 1. Cai et al. (2011) 2. Giné et al. (2011) 3. Karlan et al. (2012) 4. Morsink and Geurts (2011)	**Peer effects** 1. Dercon et al. (2012)	

Note: Table 2.1 to be continued.

Variables	Sign of determination		
	Positive	Negative	Non-significant
Social and cultural factors (continued)			
6. Religion/ fatalism	1. Cole et al. (2011)		
7. Financial literacy and education	**Financial literacy levels** 1. Cole et al. (2013) 2. Giné et al. (2008) 3. Platteau and Ontiveros (2013) **Financial training** 1. Cai et al. (2011) 2. Gaurav et al. (2011) 3. Giné et al. (2011) 4. Dercon et al. (2014) 5. Hill and Robles (2011) **Insurance games** 1. Cai and Song (2013) 2. Norton et al. (2012) 3. Patt et al. (2009, 2010) **Education** 1. Akter et al. (2008) 2. Chen et al. (2013) 3. Huber (2012) 4. Jehu-Appiah et al. (2012) 5. Jowett (2003)		**Financial literacy levels** 1. Clarke and Kalani (2012) **Financial training** 1. Bonan et al. (2012) 2. Cole et al. (2013) 3. Dercon et al. (2012) 4. Schultz et al. (2013) **Education** 1. Cole et al. (2013) 2. Giné et al. (2008)
Structural factors			
8. Informal risk sharing	1. Cai et al. (2011) 2. Mobarak and Rosenzweig (2012) 3. Dercon et al. (2014)	1. Jowett (2003) 2. Landmann et al. (2012)	
9. Quality of service	1. Basaza et al. (2008) 2. Criel and Waelkens (2003) 3. De Allegri et al. (2006) 4. Dong et al. (2009) 5. Dror et al. (2007) 6. Jehu-Appiah et al. (2012) 7. Mathauer et al. (2007) 8. Nguyen and Knowles (2010)		
10. Risk exposure	1. Arun and Bendig (2010) 2. Akter et al. (2008) 3. Ito and Kono (2010)	1. Arun et al. (2012) 2. Ito and Kono (2010) 3. Galarza and Carter (2010) 4. Giesbert et al. (2011)	1. Cole et al. (2013)
Personal and demographic factors			
11. Age	1. Cao and Zhang (2012) 2. Chen et al. (2013) 3. Giesbert et al. (2011)	1. Giné et al. (2008)	1. Cole et al. (2013)
12. Gender (female is positive)	1. Chankova et al. (2008) 2. Nguyen and Knowles (2010)	1. Bonan et al. (2012) 2. De Allegri et al. (2006)	1. Thornton et al. (2010)

Table 2.2: Effect of price on microinsurance demand

Author and year	Insurance type and location	Research design	Price elasticity	Effect on take-up rates	Overall take-up rates
Bauchet (2013)	Term life insurance; Mexico	Randomized removal of subsidy from a subsidized insurance product		· Take-up probability fell by 11 percentage points	- 69% in the experiment - 52% in reality for the actual product
Cole et al. (2013)	Rainfall insurance; Andhra Pradesh and Gujarat, India	Randomized treatment varying discount on insurance purchase (5 Rs, 15 Rs, or 30 Rs)	A 10% price decline relative to the actuarial price leads to a 10.4–11.6% increase in probability of take-up	- Take-up rates in low discount: approx. 22–36% - Take-up rates in high discount: approx. 30–47%	Approx. 25% of treated households purchased insurance
Dercon et al. (2012)	Health insurance; Nyeri, Kenya	Randomized treatment varying discount on insurance purchase (0%, 10%, or 20% discount)	A 20% price decline relative to the market price leads to a 12 percentage point increase in probability of purchasing	- Take-up rates without discount: 10% - Take up rates with 20% discount: approx. 22%	16% of farmers treated in the study purchased the insurance
Fitzpatrick et al. (2011)	Health insurance; Managua, Nicaragua	Randomized treatment of 80% subsidy on insurance		- Consider insurance utilization and retention - 6% of those insured were retained 18 months after subsidies ended	
Gaurav et al. (2011)	Rainfall insurance; Gujarat, India	Randomized treatment of money-back guarantee	Demand increases by 6.9 percentage points for those treated compared to control group	- 6.3% take-up rates in control group - 12.7% take-up rates in the subgroup offered money-back guarantee	11.4% overall take-up rates (including treated and control households)
Karlan et al. (2012)	Rainfall insurance; northern Ghana	Randomized treatment varying cash grant and insurance grant	A 50% price decline relative to the actuarial price increases probability of take-up by 31 % points	- Take-up rates at market price: 11% - Take up rates in 50% discount: approx. 42% - Take up rates in 75% discount: approx. 67%	43% of treated households purchased insurance
Mobarak and Rosenzweig (2012)	Rainfall insurance; Uttar Pradesh, Andhra Pradesh, and Tamil Nadu, India	Randomized treatment varying price of insurance product (0%, 10%, 50%, or 75% discount)	A 50% price decline relative to the actuarial price increases the probability of take-up by 17.6 percentage points	- Take-up rates at market price (in Tamil Nadu): 20% - Take up rates in 50% discount: approx. 38% - Take up rates in 75% discount: approx. 62%	Approx. 40% of treated households purchased insurance
Thornton et al. (2010)	Health insurance; Managua, Nicaragua	Randomized treatment of 6-month subsidy worth approx. USD 96		Approx. 30% of those awarded a 6-month subsidy enrolled (take-up of 0% in control group)	- Overall take-up was 20.3% - Low retention rates: only 10% of enrolees enrolled after one year

Table 2.3: Effect of access to credit/liquidity on microinsurance demand

Author and year	Insurance type and location	Research design	Effects on take-up rates	Overall take-up rates
Clarke (2011a)	Index insurance (theoretical)	Theoretical model	In the presence of basis risk, even those with access to credit will not buy insurance	
Cole et al. (2013)	Rainfall insurance; Andhra Pradesh and Gujarat, India	Randomized treatment of high cash rewards (enough to buy one policy)	Take-up for one policy increases take-up by 140%	- One quarter of treated households in the study villages buy insurance - 0% take-up in the untreated general population in the same villages
Giné et al. (2008)	Rainfall insurance; Andhra Pradesh, India	Household survey	Regression estimates show that households without access to credit have lower take-up rates	
Gollier (2003)	Dynamic model of insurance	Theoretical model	Liquidity constraints increase demand for insurance	
Huber (2012)	Life insurance; Jakarta, Indonesia	Survey	Regression estimates show positive effect of wealth on insurance uptake	
Ito and Kono (2010)	Health insurance; Karnataka, India	Household survey	Regression estimates show negative (but not significant) association between credit constraints and take-up rates	
Karlan et al. (2012)	Rainfall insurance; northern Ghana	Randomized treatment varying cash grant and insurance grant	Insignificant effect on take-up rates	43% households purchased insurance
Liu and Myers (2012)	Dynamic model of agricultural insurance	Theoretical model	Liquidity constraints reduce demand for insurance; deferred payment relaxes such constraints	
Liu et al. (2013)	Swine insurance; Sichuan province, China	Randomized treatment with different payment schemes	Take-up is three times higher among those given the option to pay at the end of the insured period	-15.7% take-up in the treatment group and 4.7% in the control group

Table 2.4: Effect of trust on microinsurance demand

Author and year	Insurance type and location	Research design	Effects on take-up rates	Overall take-up rates
Basaza et al. (2008)	Health insurance; Uganda	Focus group discussions and in-depth interviews	Lack of trust cited as a major barrier to take-up	
Cai et al. (2009)	Sow insurance; southwestern China	Randomized natural field experiment using participation in government-run scheme and subsidy as proxies for trust in government-sponsored programs	Just over 50% take-up rate of heavily subsidized insurance in control group village, suggesting lack of trust in the program	50% take-up rate for heavily subsidized insurance
Cole et al. (2013)	Rainfall insurance; Andhra Pradesh and Gujarat, India	Randomized treatment of households via visits by insurance educator who is recommended to the household by a trusted local agent	Demand is 36% higher with a recommended insurance educator	- One-quarter of treated households in the study villages buy insurance - 0% take-up in the untreated general population in the same villages
Dercon et al. (2011)	Health insurance; Nyeri, Kenya	Trust game in the lab	Decision to purchase insurance depends on the credibility of the insurer	N/A
Giné et al. (2008)	Rainfall insurance; Andhra Pradesh, India	Household survey	Probability of insurance participation increases by a factor of 8 with trust in the insurance vendor	
Liu et al. (2013)	Swine insurance; Sichuan Province, China	Randomized treatment with different payment schemes	Take-up is three times higher among those given the option to pay at the end of the insured period	-15.7% take-up in the treatment group and 4.7% in the control group
Schneider (2005)	Health insurance; Rwanda	Focus groups	Trust noted as important for enrollment	
Zhang et al. (2006)	Health insurance; China	Household survey	Lack of trust noted as a barrier to take-up	Less than 50% take-up rates in the sample

Table 2.5: Evidence of factors affecting traditional and microinsurance demand

Factor	Evidence regarding the effect on demand		Discussion
	Traditional insurance[22]	Microinsurance	
Economic factors			
Price of insurance	Negative	Negative	Even subsidized microinsurance has low take-up rates. Search costs may play a much larger role in microinsurance than in traditional markets.
Income and Wealth	Positive	Positive or no effect	Income is more difficult to measure in microinsurance markets, and may capture correlation with wealth and other household characteristics. Wealth may be a liquidity or credit constraint measure in the microinsurance market. While the effect is positive in both markets, the underlying rationale may be different and respond to distinct conditions.
Income inequality	Ambiguous		No research for microinsurance.
Inflation rate	Positive for property insurance; negative for life insurance		No research for microinsurance.
Real interest rate	Ambiguous		No research for microinsurance.
Social and cultural factors			
Risk aversion	Ambiguous	Mostly negative[23]	The negative effect in microinsurance may well relate to trust and/or basis risk or other factors. Understanding these factors could provide insight into the traditional market as well.
Non-performance and basis risk		Negative	Basis risk may be a cause for the negative results with risk aversion.
Trust and peer effects		Positive[24]	Trust might also play a role in the traditional market and be one cause for the ambiguous effect of risk aversion. Social context may influence peer effects, and appears a fruitful area for inquiry.
Financial literacy and Education		Mostly positive	Financial literacy and education may be more relevant in microinsurance because of far less experience with the product and education than in traditional markets.
Religion/ fatalism	More religious people buy more insurance except for Muslims with negative relationship	Indefinite	Little studied area. In microinsurance could relate to peer effects.

Note: Table 2.5 to be continued.

[22] The signs are largely based on Outreville (2013) and Zietz (2003), except where noted.
[23] An exception is Ito and Kono (2010); they test for prospect theory where risk-loving attitude explains low insurance demand.
[24] An exception to the positive effect of peers is Dercon et al. (2012), but they suggest that lack of trust in peers is responsible for the negative impact on demand.

Factor	Evidence regarding the effect on demand		Discussion
	Traditional insurance[25]	Microinsurance	
Structural factors			
Financial development and/or banking sector development	Positive		No specific research for microinsurance. Results could reflect the strength of the underlying infrastructure, which may affect trust in outcomes. Related to 'quality of service'.
Monopolistic market	Negative		No research for microinsurance.
Presence of foreign companies	Ambiguous		No research for microinsurance, although may relate to the concepts of trust and peer influence.
Market concentration	Negative		No research for microinsurance.
Legal environment	Positive		Similar to financial development, the legal environment may be a measure of infrastructure. It also may be a reflection of potential loss (property rights).
Enforcement of property rights	Positive		May be a reflection of potential loss if individual property rights are enforced.
Social security	Ambiguous		May be associated with informal risk sharing, a concept studied in the microinsurance market.
Informal risk-sharing		Ambiguous	[See note above]
Quality of service		Positive	Quality of service may be related to trust as well as to the idea of financial sector development. Services in microinsurance markets are expected to be of lower quality generally than those in markets with traditional insurance.
Risk exposure	Positive[26]	Ambiguous	Under-researched area with high potential for development.
Personal and demographic factors			
Population size/density	Positive		No research for microinsurance.
Urbanization	Positive (some exceptions)		No research for microinsurance.
Age	Ambiguous	Ambiguous	May depend on the type of insurance.
Gender (female)	Positive	Ambiguous	May depend on female labour market participation.

[25] These are largely based on Outreville (2013) and Zietz (2003), except where noted.
[26] See Johnson et al. (1993); Kunreuther (1996).

Appendix A

Table 2.6: Complete list of all studies

Author (year)	Paper Title	Type of insurance	Country	Research method	Sample	Journals/ Academic publications
Akotey et al. (2011)	The Demand For Micro Insurance In Ghana	Not indicated	Ghana	Survey	100 individuals	Journal of Risk Finance
Akter et al. (2008)	Determinants of Participation in a Catastrophe Insurance Programme: Empirical Evidence from a Developing Country	Catastrophe (covering house, crop, health, or income losses)	Bangladesh	Survey	3000 individuals	Paper provided by the Australian Agricultural and Resource Economics Society
Arun et al. (2012)	Bequest Motives and Determinants of Micro Life Insurance in Sri Lanka	Life	Sri Lanka	Survey	330 households	World Development
Basaza et al. (2008)	Community Health Insurance in Uganda: Why Does Enrolment Remain Low? A View from Beneath	Health	Uganda	Focus groups and interviews	185 individuals	Health Policy
Bauchet (2013)	Price and Information Type in Life Microinsurance Demand: Experimental Evidence from Mexico	Life	Mexico	Randomized field experiment	8,763 individuals	Job market paper, New York University
Bonan et al. (2012)	Is it All About Money? A Randomized Evaluation of the Impact of Insurance Literacy and Marketing Treatments on the Demand for Health Microinsurance in Senegal	Health	Senegal	Randomized field experiment and survey	360 households	ILO Research Paper
Cai et al. (2009)	Microinsurance, Trust and Economic Development: Evidence From A Randomized Natural Field Experiment	Agricultural	China	Randomized natural experiment	480 villages	Working Paper, National Bureau of Economic Research
Cai and Song (2013)	Do Hypothetical Experiences Affect Real Financial Decisions? Evidence From Insurance Take-Up	Agricultural	China	Randomized field experiment and survey	885 households	MPRA Paper
Cai et al. (2011)	Social Networks And Insurance Take-Up: Evidence From A Randomized Experiment In China	Agricultural	China	Randomized field experiment and survey	1778 and 5000 households in two experiments respectively	ILO Research Paper
Cao and Zhang (2012)	Hog Insurance Adoption and Suppliers' Discrimination: A Bivariate Probit Model with Partial Observability	Agricultural	China	Survey	531 individuals	China Agricultural Economic Review
Chankova et al. (2008)	Impact of Mutual Health Organizations: Evidence from West Africa	Health	Ghana, Mali, and Senegal	Survey	2659 house-holds in Mali, 1806 in Ghana and 1080 in Senegal	Health Policy and Planning

Note: Table 2.6 to be continued.

Author (year)	Paper Title	Type of insurance	Country	Research method	Sample	Journals/ Academic publications
Chen et al. (2013)	Smallholder Participation In Hog Insurance And Willingness To Pay For Improved Policies: Evidence From Sichuan Province In China	Agricultural	China	Survey	1684 individuals	ILO Research Paper
Clarke and Kalani (2012)	Microinsurance Decisions: Evidence from Ethiopia	Agricultural (index-based)	Ethiopia	Framed lab experiment and survey	378 individuals	ILO Research Paper
Cole et al. (2013)	Barriers to Household Risk Management: Evidence from India	Agricultural (index-based)	India	Randomized field experiment and survey	Approx. 4500 households	American Economic Journal: Applied Economics
Criel and Waelkens (2003)	Declining Subscriptions To The Maliando Mutual Health Organisation In Guinea-Conakry (West-Africa)	Health	Guinea-Conakry	Focus groups	137 individuals	Social Science and Medicine
De Allegri et al. (2006)	Understanding Consumers' Preferences and Decision to Enrol in Community-Based Health Insurance in Rural West Africa	Health	Burkina Faso	Focus groups and interviews	32 individuals	Health Policy
Dercon et al. (2011)	The Demand For Insurance Under Limited Credibility: Evidence From Kenya	Health	Kenya	Model and randomized field experiment, framed lab experiment, and survey	928 individuals	ILO Research Paper
Dercon et al. (2012)	Health Insurance Participation: Experimental Evidence from Kenya	Health	Kenya	Randomized field experiment, framed lab experiment, and survey	928 individuals	ILO Research Paper
Dercon et al. (2014)	Offering Rainfall Insurance To Informal Insurance Groups: Evidence From A Field Experiment In Ethiopia	Agricultural (index-based)	Ethiopia	Randomized field experiment and survey	291 individuals	Journal of Development Economics
Dong et al. (2009)	Dropout Analysis Of Community-Based Health Insurance Membership At Nouna, Burkina Faso	Health	Burkina Faso	Survey		Health Policy
Dror et al. (2007)	Health Insurance Benefit Packages Prioritized By Low-Income Clients In India: Three Criteria To Estimate Effectiveness Of Choice.	Health	India	Field experiment (purposive sampling)	302 individuals	Social Science & Medicine
Fitzpatrick et al. (2011)	Microinsurance Utilization In Nicaragua: A Report On Effects On Children, Retention, And Health Claims	Health	Nicaragua	Randomized field experiment and survey	4002 individuals	ILO Research Paper

Note: Table 2.6 to be continued.

Author (year)	Paper Title	Type of insurance	Country	Research method	Sample	Journals/ Academic publications
Galarza and Carter (2010)	Risk Preferences and Demand for Insurance in Peru: A Field Experiment	Agricultural (index-based)	Peru	Framed lab experiment	378 individuals	Agricultural and Applied Economics Association
Gaurav et al. (2011)	Marketing Complex Financial Products In Emerging Markets: Evidence From Rainfall Insurance In India	Agricultural (index-based)	India	Randomized field experiment and survey	600 individuals	Journal of marketing research
Giesbert et al. (2011)	Participation in Micro Life Insurance and the Use of Other Financial Services in Ghana	Life	Ghana	Survey	350 households	Journal of Risk and Insurance
Giné et al. (2008)	Patterns of Rainfall Insurance Participation in Rural India	Agricultural (index-based)	India	Survey	752 households	World Bank Economic Review
Giné et al. (2011)	Social networks, financial literacy and index insurance	Agricultural (index-based)	Kenya	Randomized field experiment and survey	1093 individuals	Discussion Paper, Yale University.
Hill and Robles (2011)	Flexible Insurance For Heterogenous Farmers: Results From A Small Scale Pilot In Ethiopia.	Agricultural (index-based)	Ethiopia	Framed lab experiment	406 individuals	Discussion Paper, IFPRI
Huber (2012)	Determinants of Microinsurance Demand: Evidence from a Micro Life Scheme in Indonesia	Life	Indonesia	Survey	208 individuals	Master's thesis, Aalto University
Ito and Kono (2010)	Why is the Take-Up of Microinsurance So Low	Health	India	Survey	209 households	The Developing Economies
Jehu-Appiah et al. (2012)	Household Perceptions And Their Implications For Enrolment In The National Health Insurance Scheme In Ghana	Health	Ghana	Survey	3301 households (13865 individuals)	Health Policy and Planning
Jowett (2003)	Do Informal Risk Sharing Networks Crowd Out Public Voluntary Health Insurance? Evidence From Vietnam	Health	Vietnam	Survey	1558 individuals	Applied Economics
Jutting (2003)	Do Community-based Health Insurance Schemes Improve Poor People's Access to Health Care? Evidence from Rural Senegal	Health	Senegal	Survey	346 households (2860 individuals)	World Development
Karlan et al. (2012)	Agricultural Decisions After Relaxing Credit And Risk Constraints	Agricultural (index-based)	Ghana	Randomized field experiment and survey	502 households	ILO Research Paper
Kouame and Komenan (2012)	Risk Preferences and Demand for Insurance Under Price Uncertainty: An Experimental Approach For Cocoa Farmers In Cote D'Ivoire	Agricultural	Cote D'Ivoire	Framed lab experiment	362 individuals	ILO Research Paper

Note: Table 2.6 to be continued.

Author (year)	Paper Title	Type of insurance	Country	Research method	Sample	Journals/ Academic publications
Landmann et al. (2012)	Insurance versus Savings for the Poor: Why One Should Offer Either Both or None	Not specified	Philippines	Framed lab experiment	466 individuals	IZA working paper
Liu et al. (2013)	Borrowing From The Insurer: An Empirical Analysis Of Demand And Impact Of Insurance In China	Agricultural	China	Randomized field experiment and survey	1684 households	ILO Research Paper
Mathauer et al. (2007)	Extending Social Health Insurance To The Informal Sector In Kenya. An Assessment Of Factors Affecting Demand	Health	Kenya	Focus groups	19 groups (10-15 individuals in each group)	International Journal of Health Planning Management
Mobarak and Rosenzweig (2012)	Selling Formal Insurance to the Informally Insured	Agricultural (index-based)	India	Randomized field experiment and survey	4667 households	Working paper, Yale Department of Economics
Morsink and Geurts (2011)	The Trusted Neighbour Effect: Local Experience And Demand For Microinsurance	Catastrophe (re-housing)	Philippines	Focus groups and interviews	171 households	Presented at the 7th Microinsurance Conference, Rio de Janeiro
Nguyen and Knowles (2010)	Demand For Voluntary Health Insurance In Developing Countries: The Case Of Vietnam's School-Age Children And Adolescent Student Health Insurance Program	Health	Vietnam	Survey	27,563 individuals	Social Science and Medicine
Norton et al. (2012)	Do Experimental Games Increase Take-Up Rates for Index Insurance? A Randomized Control Trial Approach	Agricultural (index-based)	Ethiopia	Randomized field experiment	402 individuals	Paper provided by the Agricultural and Applied Economics Association
Patt et al. (2009)	Making Index Insurance Attractive To Farmers	Agricultural (index-based)	Brazil, Malawi, Ethiopia, India, Peru, and Kenya	Case studies	6 countries	Mitigation and Adaptation Strategies for Global Change
Patt et al. (2010)	How Do Smallholder Farmers Understand Insurance, And How Much Do They Want It? Evidence From Africa	Agricultural (index-based)	Ethiopia and Malawi	Randomized field experiment and survey	278 individuals	Global Environmental Change
Platteau and Ontiveros (2013)	Understanding and Information Failures in Insurance: Evidence from India	Health	India	Interviews	554 households	Working paper, INESAD
Schneider and Diop (2004)	Community-Based Health Insurance In Rwanda	Health	Rwanda	Survey	2,518 house-holds (11,583 individuals)	World Bank Publication
Schneider (2005)	Trust In Micro-Health Insurance: An Exploratory Study In Rwanda	Health	Rwanda	Focus groups	24 groups	Social Science & Medicine

Note: Table 2.6 to be continued.

Author (year)	Paper Title	Type of insurance	Country	Research method	Sample	Journals/ Academic publications
Schultz et al. (2013)	The Impact Of Health Insurance Education On Enrollment Of Microfinance Institution Clients In The Ghana National Health Insurance Scheme, Northern Region Of Ghana	Health	Ghana	Randomized field experiment and survey	1505 individuals	ILO Research Paper
Tadesse and Brans (2012)	Risk, Coping Mechanisms, And Factors In The Demand For Micro-Insurance In Ethiopia	Agricultural (index-based)	Ethiopia	Focus groups and interviews	95 individuals in focus groups and 48 in interviews	Journal of Economics and International Finance
Thornton et al. (2010)	Social Security Health Insurance for the Informal Sector in Nicaragua: A Randomized Evaluation	Health	Nicaragua	Randomized field experiment and survey	2608 individuals	Health Economics
Zhang et al. (2006)	Social Capital And Farmer's Willingness-To-Join A Newly Established Community-Based Health Insurance In Rural China	Health	China	Survey	1157 households	Health Policy

Chapter 3

Group Insurance and Self-Protection: The Role of Pro-Social Preferences

with Christian Biener, Martin Eling and Andreas Landmann*

Abstract

We examine whether pro-social behavior in insurance groups can mitigate moral hazard. Using innovative field and computer laboratory experiments, we investigate endogenous self-protection decisions under risk with exogenous variations in insurance. In line with ex ante moral hazard, our results show a decrease in self-protection with increasing insurance coverage. We theoretically and empirically show that pro-social preferences under a group insurance scheme mitigate the ex ante moral hazard condition. The results have general implications for policy design under risk and asymmetric information: group joint liability can alleviate moral hazard and lead to efficiency improvements when individuals care for each other.

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3.1 Introduction

Moral hazard is a well-established economic problem.[1] In many real-life situations, individuals choose their exposure to risk through a costly manipulation of the probability of financial losses, in other words, they engage in self-protection. The central implication of this ex ante moral hazard in insurance is that insured individuals change their behavior by investing less in reducing the probability of financial losses after the insurance contract is concluded. Ex ante moral hazard poses the threat of substantial social welfare losses in the form of increasing insurance premiums, limitations on available insurance coverage, and less loss prevention (i.e., self-protection) than is socially desirable. Although empirical evidence is scarce, in recent contributions, Yilma, Kempen, and Hoop (2012) and Spenkuch (2012) show that in the health care market, which is usually considered immune to these "perverse incentives," insurance reduces self-protection efforts by up to 20 percent. In its most extreme form, ex ante moral hazard leads to the outright failure of markets (Arrow, 1963; Pauly, 1968). The most prominent solution applied to this problem is partial insurance, such as by utilizing deductibles, resulting in welfare losses by imposing residual risk on the insured despite widely held preferences for full insurance (Barseghyan et al., 2013).

In this paper, we provide theoretical intuition and empirical evidence illustrating the effectiveness and efficiency of group insurance for solving ex ante moral hazard in the presence of pro-social preferences. Arnott and Stiglitz (1991) consider market and nonmarket (i.e., risk sharing in social groups) insurance as two competing approaches. Nonmarket insurance solves ex ante moral hazard only when self-protection effort is observable. We show that the conjunction of market and nonmarket insurance under group insurance renders the observability of self-protection less relevant for the efficient provision of self-protection in the presence of pro-social preferences. The basic logic is that under joint liability, self-protection is essentially a public good to which individuals contribute more than their private benefit would suggest—as predicted by several theories of pro-social preferences (e.g., Rabin, 1993; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Fehr and Gächter, 2000a, b; Fehr and Fischbacher, 2003).

To the best of our knowledge, this is the first paper to apply ideas from the literature on pro-social behavior to problems resulting from information asymmetries in insurance as well as the first empirical evaluation of the effectiveness of social groups in this context. The idea of mitigating incentive problems in insurance through social

[1] See Rowell and Connelly (2012) for a review of the history of the term "moral hazard."

groups is not merely interesting from a theoretical perspective but can also be applied in practice, as shown by several recent examples. Initial group schemes with joint liability have been implemented in both developing countries, such as the mutual insurance funds model Fondos in Mexico (World Bank, 2013), and in developed countries through so-called "peer-to-peer" insurance schemes, such as Friendsurance (Germany), Hey Guevara (United Kingdom), and PeerCover (New Zealand).

Our empirical results are based on an innovative experiment that was implemented in two independent settings, a field laboratory experiment with rural villagers from the Philippines and a computer laboratory experiment with students in Germany. In line with ex ante moral hazard, we find that self-protection effort decreases with increasing insurance coverage. In particular, the likelihood of investing in self-protection falls by 11.8 (Philippines) and 48.7 (Germany) percentage points when insurance with high coverage is introduced. Group insurance performs significantly better than individual insurance in terms of incentivizing self-protection given similar individual levels of risk exposure. This is consistent with our theoretical results when incorporating pro-social preferences and implies significant efficiency gains in the provision of insurance through group schemes. We further find that reciprocal motives seem to be very important. In particular, for those with positive beliefs about their group peer's self-protection, the likelihood of investing in self-protection is 19.9 (Philippines) and 20.9 (Germany) percentage points higher compared with individual insurance. Limited joint liability in group insurance thus constitutes a condition under which insurance and self-protection are not substitutes. In contrast to much of the empirical evidence on ex ante moral hazard in insurance, our empirical approach does not suffer from a discrimination problem between moral hazard and adverse selection.[2]

Our work contributes to the theoretical and empirical literature on information asymmetries in insurance markets (Ehrlich and Becker, 1972). In particular, evidence of the relevance of ex ante moral hazard is limited. Existing empirical work mostly focuses on the United States and non-life markets such as worker compensation (Butler and Worrall, 1991; Kaestner and Carroll, 1997; Bolduc et al., 2002; Autor, Duggan, Gruber, 2014) and automobile insurance (Cummins and Tennyson, 1996; Cohen and Dehejia, 2004; Dionne, Michaud, and Dahchour, 2013), for which the ex ante moral hazard hypothesis is usually confirmed. Few empirical studies focus on health insurance, and those studies primarily consider a developed country context and

[2] A necessary precondition for the identification of moral hazard is an observed positive correlation between insurance coverage and insured losses. However, two types of behavior—i.e., moral hazard (ex ante and ex post) and adverse selection—may be the cause of this observation. Empirical studies that do not have complete information about the riskiness of individuals and, convincingly, consider selection into insurance to be exogenous suffer from this discrimination problem (Chiappori and Salanié 2000).

provide mixed evidence.[3] More generally, our work is related to the literature on principal-agent problems with moral hazard, particularly situations under risk in which effort is not observable. One example in this context is the impact of contractual forms on employees' decisions to invest in unobservable effort that increases firm profits. Simple lump-sum bonus contracts are found to induce effort (Herweg, Müller, and Weinschenk, 2010; Biais et al., 2010) but might be unattractive to risk-averse individuals. In addition to the lack of evidence on the empirical relevance of ex ante moral hazard, there is a gap in the analysis concerning approaches to either eliminate or alleviate such hazards. We show that sharing rewards is a potentially effective mechanism for increasing efficiency in teams consisting of pro-social individuals, which is especially attractive to risk-averse agents.

A second strand of literature to which this work contributes addresses informal contract enforcement through social groups. Arnott and Stiglitz (1991) emphasize the value of informal contract enforcement through peer monitoring for solving moral hazard problems. More recently, the literature on microfinance shows how group-lending contracts can alleviate moral hazard, both theoretically (Ghatak and Guinnane, 1999) and empirically (Karlan, 2005; Karlan, 2007; Al-Azzam, Hill, and Sarangi, 2012; Bauer, Chytilová, and Morduch, 2012; Giné and Karlan, 2014; Engel, 2014). We show that social groups may also help to overcome moral hazard problems in insurance markets.

Third, we contribute to the rapidly growing literature on insurance in developing countries (e.g., Cole et al., 2013; Banerjee, Duflo, and Hornbeck, 2014), in part because one of our participant pools is drawn from a low-income population. Some studies indicate that moral hazard is a likely barrier to low-income insurance market development (Kutzin and Barnum, 1992; Cohen and Sebstad, 2005; Barnett, Barrett, and Skees, 2008) and restricts low-income populations' access to insurance services, thus removing a potentially powerful weapon from the fight against poverty. The usual solutions of limiting insurance coverage or increasing insurance premiums are particularly unattractive for low-income individuals because they are in need of effective and cheap protection. Additionally, although individualized financial products are the norm in developed economies, joint liability might be more acceptable in developing countries, where social networks play a larger role in (often informal) financial transactions (Fafchamps and Lund, 2003). This is evident, for example, from the vast prevalence of group-lending schemes. Furthermore, other

[3] See Yilma, Kempen, and Hoop (2012) for a review of the literature and the initial empirical evidence related to low-income insurance.

forms of collective institutions, such as farmer associations, self-help groups, and rotating savings and credit associations (ROSCAs), are very common in developing countries and could serve as vehicles for group insurance.

The remainder of this paper proceeds as follows. In Section 3.2, we introduce our theoretical framework. Section 3.3 contains a description of the experimental design. In Section 3.4, we describe the experimental procedures and the characteristics of our sample populations. Section 3.5 provides a discussion of our results; we conclude in Section 3.6.

3.2 Incentives for self-protection

We formalize the individual and group insurance contracts and relate them to the emergence of ex ante moral hazard by modeling the optimal amount of self-protection under each insurance contract. To this end, we rely on a theoretical foundation originating with Ehrlich and Becker (1972) and their successors.[4] The new theoretical aspects introduced in this paper are the formal description of group insurance and the analysis of group insurance in an expected utility and pro-social preferences framework.

3.2.1 Optimal self-protection in the absence of insurance

Consider an individual with von Neumann-Morgenstern utility function $U(.)$, $U'(.) > 0$ and initial wealth W, which is subject to a random loss $L < W$ with probability p. The state of nature $z \in \{0,1\}$ indicates whether a loss occurred ($z = 1$) or not ($z = 0$). The individual can reduce the loss probability p by investing effort e in self-protection. The probability p thus becomes a function of effort e for which $p'(e) < 0$. The individual's final wealth is $Y_z = W - e - L \cdot 1_{z=1}$. The optimal investment in self-protection e^* would maximize the individual's expected utility (EU):

$$(1)\ EU = p(e)U(Y_1) + [1 - p(e)]U(Y_0),$$

where $Y_0 = W - e$ and $Y_1 = W - e - L$. The first-order condition $\partial EU/\partial e$ for optimizing Equation (1) with respect to *e* is as follows:

[4] Additions to and extensions of the interplay between self-protection and insurance are found in Dionne and Eeckhoudt (1985), Hiebert (1989), Briys and Schlesinger (1990), Briys, Schlesinger, and Schulenburg (1991), Sweeney and Beard (1992), Konrad and Skaperdas (1993), Jullien, Salanié, and Salanié (1999), Courbage (2001), Lakdawalla and Zanjani (2005), Muermann and Kunreuther (2008), and Lohse, Robledo, and Schmidt (2012). Our formal representation draws heavily on Briys and Schlesinger (1990).

$$(2)\quad -p'(e)[U(Y_0) - U(Y_1)] = p(e)U'(Y_1) + \big(1 - p(e)\big)U'(Y_0).$$

The first term in Equation (2) is the marginal utility gain from the reduction in p. For the first-order condition to hold, the marginal utility gain from self-protection must equal the marginal utility loss from reducing wealth *Y* in both states, which is reflected in the term on the right-hand side of Equation (2). It is not trivial how this optimal level of self-protection changes with risk aversion. Briys and Schlesinger (1990), for example, show that the optimal level of self-protection e^* can either increase or decrease in risk aversion. This relationship is intuitive because the cost of self-protection makes the worst possible outcome even worse, although the probability of the worst possible outcome is reduced. Jullien, Salanié, and Salanié (1999) further show that if the initial probability of a loss is low, more risk-averse agents prefer to self-protect, whereas if the loss probability is high, they prefer to reduce losses in the unfavorable state of the world, thus reducing self-protection because of its costs. In essence, the optimal level of self-protection e^* depends on the initial loss probability p and the level of risk aversion.[5]

3.2.2 Optimal self-protection under individual insurance

Following Pauly (1974), we can represent different degrees of insurance by *x* units of insurance coverage at premium cost *c* per unit. An equivalent situation can be created via insurance with $D = L - x$ units of deductible; we use this deductible notation to analyze insurance with different deductible arrangements below. We follow Rothschild and Stiglitz (1976), Holmström (1979), and Shavell (1979), among others, by assuming that the insurer cannot observe the individual's self-protection decision and thus cannot condition *c* on self-protection *e*.[6] Final wealth thus changes to $Y_z = W - e - c \cdot (L - D) - D \cdot 1_{z=1}$, and hence the difference $U(Y_0) - U(Y_1)$ is increasing in the deductible D. Again, we calculate the optimal investment in self-protection e^* by maximizing the individual's EU, such that Equation (2) is fulfilled. It is straightforward to see that in the case of full insurance ($x = L \Leftrightarrow D = 0$), there is no incentive for self-protection because $U(Y_0) = U(Y_1)$ and the marginal benefit of self-protection becomes zero. Without coverage ($x = 0 \Leftrightarrow D = L$), the incentive is equivalent to the no-insurance case. Generally, the marginal benefit of self-protection effort on the left-hand side of Equation (2) is decreasing in insurance coverage. The behavior of the right-hand side is less clear and will depend on the exact specification

[5] Dionne and Eeckhoud (1985) provide differentiated results regarding ranges of initial probabilities for a selection of utility functions. For quadratic utility functions, they show that self-protection increases (decreases) with risk aversion if p < (>) 0.5. The results for logarithmic and exponential utility functions are ambiguous.

[6] Perfect observation of risk-taking, in general, is either impossible or prohibitively expensive (Holmström, 1979; Shavell, 1979; Arnott and Stiglitz, 1991). Even if insurers are able to discriminate between those investing in self-protection and those who are not, insurance regulation often inhibits discrimination.

of the utility function and its respective parameters. As Pauly (1974) argues, however, it is straightforward to construct examples in which optimal self-protection is monotone and decreasing in insurance coverage. The implication of this result for our experiments is that self-protection levels under individual insurance should be below the no-insurance case and decrease with insurance coverage (i.e., increase with the deductible).

3.2.3 Optimal self-protection under group insurance

In the moral hazard model of Arnott and Stiglitz (1991), individual insurance (i.e., market insurance) and risk sharing in social groups (i.e., nonmarket insurance) are treated as two competing approaches. Nonmarket insurance solves ex ante moral hazard only when self-protection effort is observable. Here, we unite market and nonmarket insurance under a group insurance scheme.[7] This concept includes a contractually agreed mutual sharing of losses ("joint liability") below a deductible, a feature that is used to design incentive-compatible contracts when ex ante moral hazard is present. Figure 3.1 illustrates the states of wealth for one agent under an individual insurance contract (Panel A) and under a group insurance scheme (Panel B).

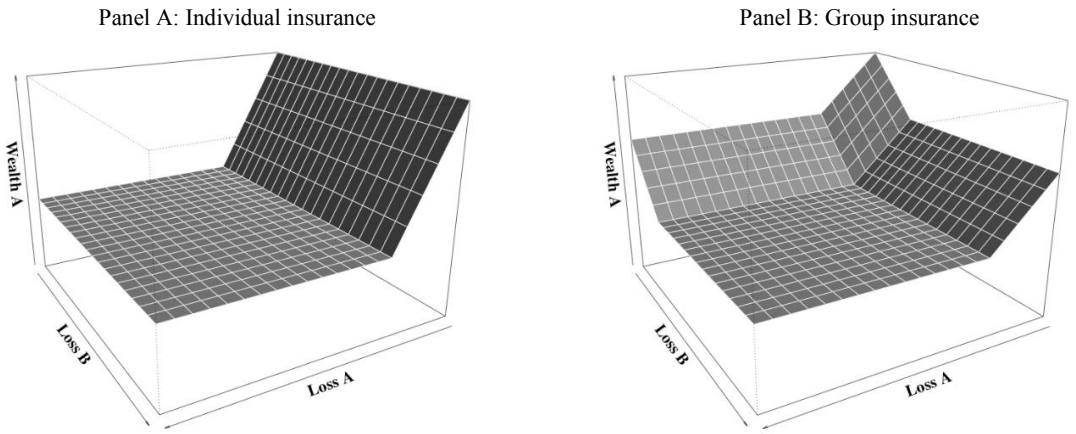

Figure 3.1. States of wealth of agent A contingent on own and agent B's loss for individual insurance (panel A) and group insurance (panel B)

For group insurance, investment in self-protection essentially becomes a public good because one agent's decision to reduce the loss probability directly affects the expected payouts of the other agent, from which the agent cannot be excluded.

[7] Clarke (2011b) considers a similar concept.

Suppose again that insurance with a deductible $D = L - x$ (i.e., partial insurance with $x = L - D$ units of coverage) is available at cost $c \cdot (L - D)$ but that the risk inherent in the deductible is shared between two agents in a group insurance policy. The four possible states of wealth are then $Y_{00} = W - e - c \cdot (L - D)$, $Y_{01} = W - e - c \cdot (L - D) - \frac{D}{2}$, $Y_{10} = W - e - c \cdot (L - D) - \frac{D}{2}$ and $Y_{11} = W - e - c \cdot (L - D) - D$, where Y_z is the outcome under the different states of the world $z \in \{00,01,10,11\}$, with the first digit indicating the loss state of individual i and the second digit indicating the loss state of individual j. It follows that $EU_i = \sum_z p_z(e_i, e_j)U_i(Y_z)$, where p_z is composed of $p_i(e_i)$ and $p_j(e_j)$. Using again the first-order condition as in Equation (2) and assuming full insurance and thus $D = 0$, we obtain the same result as in the individual insurance case with $e_i^* = 0$. The group insurance scheme with partial coverage, however, may generate lower optimal levels of self-protection effort e^* compared with the equivalent individual insurance. Applying the first-order condition, we can see that the marginal utility gain from self-protection represented by the left-hand side of Equation (2) is lower for group insurance than for individual insurance:[8]

$$(3)\quad -p'(e_i)\big[(p_j\big(U(Y_{01}) - U(Y_{11})\big) + (1 - p_j)\big(U(Y_{00}) - U(Y_{10})\big)\big].$$

The reason for the reduced gain is that only half of the deductible will be saved in the loss case instead of the whole deductible in the individual insurance case. The exact gain in utility terms depends on the shape of the utility function, but as a reference point, for risk-neutral individuals, it is half of the utility gain under individual insurance (as $Y_{01} = Y_{10} = \frac{Y_{11}+Y_{00}}{2}$, $Y_{11} = Y_1$, $Y_{00} = Y_0$ and $U'(.)$ is constant). On the cost side, represented by the right-hand side of Equation (2), the change also depends on the shape of the utility function, but the direction of this change is less clear than in the individual insurance case:

$$(4)\quad p_i p_j U'(Y_{11}) + p_i(1 - p_j)U'(Y_{10}) + (1 - p_i)p_j U'(Y_{01}) + (1 - p_i)(1 - p_i)U'(Y_{00}).$$

Group insurance shifts some of the weight from the marginal utilities at the extreme points Y_{11} and Y_{00} to their average of $Y_{01} = Y_{10}$. For risk-neutral individuals with constant marginal utility, this condition is irrelevant. For risk-averse or risk-loving individuals, however, there might be a change that depends, inter alia, on $U'''(.)$, i.e.,

[8] We ignore beliefs about player j's self-protection decision from this point onwards, i.e., we treat the loss probability p_j as given. We revisit this assumption and specifically discuss the role of beliefs at the end of this section.

prudence (Liu and Meyer, 2012). It is thus possible that there is also a change in costs associated with self-protection under the group scheme, but such a change is less obvious and more sensitive to assumptions regarding the shape of the utility function. We show in later simulations that popular parametric specifications of the utility function clearly predict a decrease in self-protection. Intuitively, sharing the deductible works similarly to reducing the deductible in terms of not only its incentive effect but also its exposure to risk. The negative effect of group insurance on the incentive for self-protection also holds for groups of sizes of $n > 2$, where each deductible would be divided by n (proof in Appendix A). Again, as a reference point, the utility gain from self-protection for risk-neutral individuals would be the utility gain under individual insurance divided by n. As $n \to \infty$, the situation converges to a situation with full insurance such that the optimal self-protection decision converges to $e_i^* = 0$.

3.2.4 Optimal self-protection under group insurance and pro-social preferences

The remarkable aspect of the group insurance scheme becomes obvious when we consider pro-social preferences as introduced by Rabin (1993), Fehr and Schmidt (1999), and Bolton and Ockenfels (2000), among others. The fundamental idea is that individuals are concerned not only with their own payoffs but also with the payoffs of other individuals or, more broadly, with a desire to "do the right thing" or to "make the moral" choice (Levitt and List, 2007). The literature reveals a great willingness to contribute to public goods (Chaudhuri, 2010) despite the individual incentive to free-ride on the contributions of others. In our setting, an individual's investment in self-protection under the group insurance scheme can be seen as a public good contribution because it decreases both group peers' loss probability. We therefore assume that the pro-social individual i in some positive way cares about the benefit of individual j such that $\partial U_i / \partial Y_j > 0$:

$$(5)\quad EU_i = \sum_z p_z(e_i, e_j) U_i\left(Y_{z,i}, Y_{z,j}\right).$$

If we compare the marginal cost side of self-protection to the version without pro-social preferences, there is no obvious change in incentives; e_i is still borne privately, and thus the utility costs depend on the partial derivative of the utility function with respect to Y_i, similar to Equation (4):[9]

[9] Including a second dimension Y_j in the utility function can have arbitrary shape effects such that the partial derivative with respect to Y_i might change. However, the manipulation should preserve some properties of the self-interested utility function (such as approximate risk aversion) for a ceteris paribus comparison. One property-preserving manipulation would be to assume separability of the utility function such that individual i acts like a self-interested agent whenever the outcome of individual j cannot be influenced. In this case, the marginal costs of self-protection would be equivalent to the costs without pro-social preferences. Below, we will discuss different ways of modeling pro-social preferences in our setting. As a general

$$(6)\quad \begin{matrix} p_i p_j U_i'(Y_{11,i}, Y_{11,j}) + p_i(1-p_j)U_i'(Y_{10,i}, Y_{10,j}) + \\ (1-p_i)p_j U_i'(Y_{01,i}, Y_{01,j}) + (1-p_i)(1-p_i)U_i'(Y_{00,i}, Y_{00,j}) \end{matrix}'$$

where $U_i'(.,.)$ is the partial derivative w.r.t. Y_i. The marginal benefit, however, now reads as follows:

$$(7)\quad -p'(e_i)\begin{bmatrix} p_j\left(U_i(Y_{01,i}, Y_{01,j}) - U_i(Y_{11,i}, Y_{11,j})\right) \\ +(1-p_j)\left(U_i(Y_{00,i}, Y_{00,j}) - U_i(Y_{10,i}, Y_{10,j})\right) \end{bmatrix}.$$

This means that the marginal benefit still includes the benefit of increasing Y_i but now further accounts for the increase in Y_j. For illustrational purposes, Equation (7) can be divided into one part containing the utility change caused by the increase in Y_i, similar to Equation (3), and an additional part containing the utility change through Y_j. Although there is now an obvious change in incentives, the exact change still depends on functional form assumptions. The general formulas nevertheless provide an intuition that the incentive to self-protect under group insurance should increase with pro-social concerns. A benchmark example reads as follows:

A risk-neutral individual i without pro-social preferences $U_i(Y_{z,i}, Y_{z,j}) = Y_{z,i}$ *has the same marginal costs but half the marginal benefit of self-protection when comparing group to individual insurance. Introducing pro-social concerns* γ *such that* $U_i(Y_{z,i}, Y_{z,j}) = Y_{z,i} + \gamma \cdot Y_{z,j}$*, the marginal benefit increases with* γ *until incentives are equivalent in the individual and the group insurance case once* $\gamma = 1$.

When diverging from risk neutrality, the setting becomes more complicated because the marginal utility of wealth is not constant. Generally, modeling pro-social behavior in risky environments is not a standardized task, and there is no common approach to doing so. The existing modeling approaches for pro-social preferences are not designed for risky environments. Absolute utility is sensitive to scaling by risk-aversion parameters, and it is difficult to maintain a sensible weighting of player *j*'s wealth when varying risk-aversion parameters.[10] We avoid the problem by restricting

remark, any specification of pro-social preferences that substantially increases the marginal costs of sacrificing income when caring about someone else would be quite counterintuitive, in our view.

[10] Fudenberg and Levine (2012) provide initial insights into the difficulties of jointly modeling risk and fairness preferences, and Saito (2013) contributes to the topic by generalizing the Fehr and Schmidt (1999) model of inequality aversion to risky situations.

our attention to two alternative specifications in which Y_i and Y_j are subject to scaling by the same utility function $U_i(.)$, the details of which are discussed in Section 3.2.5.

Thus far, we have not discussed the role of beliefs about the self-protection decisions of group peers, but there are at least two reasons that these beliefs are important. First, the self-protection effort e_j affects the probability p_j and *j*'s wealth $Y_{z,j}$, which might change both the marginal costs and benefits of self-protection. For risk-neutral individuals (i.e., constant marginal utility in Y_i and Y_j) this does not play a role, but the absolute costs and benefits of self-protection change for all other types. The second reason is very important in our view. The literature on pro-social preferences recognizes reciprocity or conditional cooperation (Keser and van Winden, 2000; Fischbacher, Gächter, and Fehr, 2001) as a powerful driver of pro-social behavior. It implies the conditionality of pro-sociality on the fairness of others, that is, agent *i*'s beliefs about agent *j*'s self-protection $\tilde{e}_i$ might drive the degree of pro-social concerns γ. Such dependence can easily be motivated by applying Rabin's (1993) fairness model to our setting (see Appendix B). We therefore specifically elicit and analyze beliefs in our experiment.

3.2.5 Simulations

To make predictions regarding the preference for self-protection in our experimental setup in Section 3.3, we utilize simulations based on our theory as discussed in this section and the experimental parameters given in the subsequent section. We consider the valuation of lotteries by a von Neumann-Morgenstern utility function with constant relative risk aversion (CRRA) of the functional form $\mathrm{u}(y) = y^{(1-\rho)}$ for $\mathrm{y} > 0$ with risk-aversion parameter ρ, whereas $\rho > 0$ implies risk aversion, $\rho = 0$ risk neutrality, and $\rho < 0$ risk preference. When $\rho = 1$, the natural logarithm is used; the term $y^{(1-\rho)}$ is divided by $(1-\rho)$ when $\rho > 1$ (Holt and Laury, 2002). For the self-interested preference concept, our simulation model estimates EU—i.e., Equation (1)—for the lotteries defined by our treatment characteristics in Table 3.1 for a range of risk-aversion parameters $\rho \in [-10, 20]$. Each lottery is evaluated under $e_i = 1$ and $e_i = 0$ for each ρ. For each ρ for which $EU^{\rho}_{e_i=1} > EU^{\rho}_{e_i=0}$ under a given treatment, investment in self-protection is preferred.

Under the pro-social preference concepts applied to group insurance, we estimate EU by Equation (5), whereas utility is subject to scaling by the same utility function $U_i(.)$. We consider utility in Equation (5) as represented by:[11]

[11] Appendix C provides a discussion of the drawbacks and advantages of using this approach and an alternative based on separability of utility with regard to Y_i and Y_j.

$$(8)\quad U_i\left(Y_{z,i}, Y_{z,j}, \gamma\right) = U_i\left(Y_{z,i} + \gamma \cdot Y_{z,j}\right).$$

When using simulations with parametric specifications of utility functions, we introduce three different archetypes of pro-social behavior along the continuum of possible behavioral types in our framework for pro-social preferences. The first archetype is purely self-interested ($\gamma = 0$). The second type weights one's own payoff and the payoff of the group peer equally ($\gamma = 1$). The third type also fully accounts for payoffs of group peers ($\gamma = 1$) but additionally adapts risk taking consistent with the recent literature on risk taking on behalf of others (e.g., Andersson et al., 2013). In our case, extremely risk-averse or risk-loving types would behave more moderately because they know that not everyone will agree with their preferences.[12] The utility function used by one individual under the third type would then be an intermediate form between one's own utility function and those of other group peers. We operationalized the adaptation of risk aversion by taking the average risk-aversion parameter between individual i and the median of the actual risk-aversion parameters in the respective samples. This is one of many possible specifications to illustrate the sensitivity of self-protection to pro-social concerns.

The utility evaluation under group insurance with pro-social concerns depends not only on risk-aversion adaptation and the level of pro-sociality γ but also on the direct impact of the self-protection effort of j, e_j, the probability p_j and j's wealth $Y_{z,j}$; thus, we estimate EU separately for $e_j = 1$ and $e_j = 0$.

3.3 Experimental design

3.3.1 Self-protection game

We model the self-protection choice under different insurance settings in artifactual field and laboratory experiments. Risk is introduced in the form of a lottery that involves drawing a ball from an opaque bag containing ten balls (four orange, six white). Orange balls represent a loss (L); white balls indicate no loss. Every participant is provided with an initial endowment W. This design incorporates the prospect of losing money instead of winning money as stressed by, for example, Harrison and Rutström (2008). The payoff of participants thus is W with $p = 0.6$ and $W - L$ with $p = 0.4$. Self-protection is simulated by exchanging a bag with four orange and six white balls for one with only two orange balls and eight white balls against an effort

[12] The third archetype adapts to the risk aversion of the co-player. The consequences of adaptation depend on the predominant risk aversion in the sample (see Appendix D).

cost of e. The payoff of participants when using this option is $W - e$ with $p = 0.8$ and $W - e - L$ with $p = 0.2$. We use an initial endowment of $W = 300$, a loss of $L = 200$, and a cost of self-protection of $e = 20$. Whereas for the Philippine field laboratory setting the laboratory currency is exchangeable to real Philippine pesos (PHP) at a rate of 1:1, the laboratory currency for the German computer laboratory setting is exchangeable to real Euro (EUR) at a rate of 20:1.[13]

3.3.2 Treatments

Although every subject played the basic self-protection game as presented in Section 3.3.1 over three rounds, we randomly assigned subjects to one of four treatments and one control setting for the main rounds four through six. The treatments were subdivided into two primary insurance treatments—individual insurance, referred to as *I*, and group insurance, referred to as *G*. Both primary insurance treatments again included two sub-manipulations. Insurance uptake was mandatory in all treatments. Those assigned to the control group *C* again played the basic self-protection game in rounds four through six. A comprehensive overview of all treatments is presented in Table 3.1.

For the individual insurance treatment, we varied the deductible *D*. I_{low} had a high deductible of 100 (i.e., low coverage), and I_{high} had a low deductible of 40 (i.e., high coverage). The basic idea of varying the level of coverage was to vary the economic incentive to invest in self-protection, which is essentially what insurance does. Whereas self-protection under the low coverage policy has an expected value of zero, under the high coverage policy, self-protection is unattractive for most rational individuals because it has a negative expected value (see Panel B.2 of Table 3.1).

The group insurance treatment *G* differed from individual insurance I_{low} in that this type of insurance covered groups of two and in that losses below the deductible were shared within the group.[14] Although the deductible and premium are equal to I_{low},

[13] The official U.S. dollar exchange rates were 43.3 PHP per U.S. dollar in early October 2013 and 0.929 EUR per U.S. dollar in early April 2015. For the Philippine sample, the maximum real gain of PHP 300 from the experiment for each participant is equivalent to approximately 7.0 U.S. dollars (15.5 U.S. dollars in purchasing power parity (PPP) using the latest available PPP conversion factor for private consumption of 19.4 from 2013; World Bank, 2015b) and is slightly above the minimum daily wage of PHP 250 in the agricultural sector in the Iloilo province as of October 2013 (Republic of the Philippines, 2013). Note that few of the people in our target population actually earn this minimum wage. The median daily earnings of those participants receiving a daily wage (19 percent of total sample) are only PHP 200. For the German sample, the maximum real gain of EUR 15 (i.e., 300 divided by 20) from the experiment for each participant is equivalent to approximately 16.2 U.S. dollars (18.1 U.S. dollars in purchasing power parity (PPP) using the latest available PPP conversion factor for private consumption of 0.8 from 2013; World Bank, 2015b).

[14] Behavior in our group insurance scheme may be susceptible to the size of the group. Although restricting the group size to two individuals maximizes the number of observations in our experimental setup, it raises questions regarding the robustness with increasing group size. Although we did not test for the effect of group size in our setup, experimental evidence from microfinance indicates that cooperation in groups with joint liability is relatively robust to a variation in group size (Abbink,

group insurance effectively provides slightly more risk protection because the risk inherent in the deductible is shared within the group. This renders self-protection unattractive for most self-interested rational individuals because it has a negative expected value (see Panel B.2 of Table 3.1). Treatment $G_{private}$ implemented group insurance with self-protection as private information, whereas in G_{public}, we made self-protection observable within the group by informing each participant of whether their group peer invested in self-protection at the end of a round.

To calibrate the monetary values in our experiment, we ensured that the premiums were related to the expected value of claims and thus reflected the differences in deductibles. Because the actual price of an insurance policy is its loading, we added a 25 percent markup to all insurance treatments. The insurer's inability to observe self-protection in our experimental setting resembled real-world scenarios in that insurers usually are not able to detect such behavior at reasonable cost, which is particularly true for low-income insurance markets in developing countries. The effort cost for self-protection $e = 20$ was chosen such that it would be economically beneficial to invest in self-protection while having no insurance even for risk-neutral and some risk-loving CRRA subjects.

3.3.3 Research questions and hypotheses

Our experimental design permits investigation of two main research questions. The first is whether increasing insurance coverage decreases self-protection under individual insurance as predicted by classic economic theory (Pauly, 1974) and is economically rational because insurance reduces the wealth difference between no-loss and loss states such that wealth becomes less dependent on ex ante risk taking. A positive answer to this question renders the subsequent question about alternative forms of contracts relevant. In particular, we pose the question of whether group insurance achieves a higher level of self-protection compared with individual insurance and under which conditions this may hold true, particularly for which of the three pro-social archetypes. For each of the research questions, we make predictions regarding the share of self-protection in our sample population under each treatment based on simulations of normative theory as described in Section 3.2.5. Panel B of Table 3.2 shows the risk-aversion parameter domain for which individuals are

Irlenbusch, and Renner, 2006). We randomly varied network strength in the Philippine sample. Strong networks consisted of the originally invited player and the accompanying peer. Weak groups were formed by randomly assigning an originally invited person to another participant. This variation was implemented within a session—that is, there would usually be two strong and two weak groups in each $G_{private}$ session. This approach decreased the number of observations per session for one treatment. To keep the number of individual observations in each variant similar to the other treatments, we conducted more sessions in the cases of treatments $G_{private}$.

expected to invest in self-protection under CRRA expected utility theory in our experimental setting.

The predictions of the proportion of the sample population investing in self-protection for all treatments shown in Panel C of Table 3.2 utilize the Binswanger (1980) ordered lottery selection approach, from which we estimate the distribution of the risk-aversion parameters of our sample (see Appendix D).[15]

***Hypothesis 1*:** We expect that increasing insurance coverage will decrease the likelihood of investing in self-protection under individual insurance (*H1*). As increasing insurance coverage reduces the wealth difference between the no-loss and the loss states, the incentives to invest in self-protection are reduced. To test this hypothesis, we would need to observe a decreasing share of self-protection decisions moving from no insurance coverage to low insurance coverage and further to high insurance coverage. Following our theoretical predictions in Table 3.2, we expect to observe a significant share of 82 (Philippines) and 85 (German) percent of the sample population investing in self-protection under the control group and a slightly lower share of 64 (Philippines) and 81 (German) percent under the individual insurance treatment with low coverage. Those under the individual insurance treatment with high coverage would not find it beneficial to invest in self-protection.

***Hypothesis 2*:** Under group insurance, levels of self-protection should depend on the distribution of pro-social types. Without any pro-social motives, investment in self-protection should be even lower than under high-coverage insurance, but depending on the degree to which individuals care for each other, higher levels could be supported by theory. If individuals equally weight their own and their group peer's payoff, we should, for example, observe even higher levels of self-protection (i.e., 71 percent in the Philippine sample and 91 percent in the German sample) than under low-coverage insurance (i.e., 64 percent in the Philippine sample and 81 percent in the German sample). The fact that individuals might adapt their risk-taking behavior if it affects others ("adapt ρ") might even lead to more self-protection effort (i.e., 93 percent in the Philippine sample and 98 percent in the German sample) than without insurance (82 percent in the Philippine sample and 85 in the German sample). Hence, the degree to which self-protection under group insurance reaches or even exceeds the levels

[15] There are a multitude of other prevalent approaches to eliciting risk preferences, such as the multiple price list (Miller, Meyer, and Lanzetta 1969; Holt and Laury 2002) and the certainty equivalent approach (Becker, Degroot, Marschak 1964). We opted for the ordered lottery selection method because it is readily understandable and, in particular, has been previously used in a low-income developing country setting (Cole et al. 2013). For the German sample, we also applied the multiple price list design as in Holt and Laury (2002). The resulting predictions regarding the share of the population for which self-protection is preferred are 1 (*C*), 0 (I_{high}), 0.77 (I_{low}), 0 (*G*), 0.77 ($G_{keep\ \rho}$), 0.94 ($G_{adapt\ \rho}$), thus establishing similar predictions.

observed under individual insurance can be regarded as a test for the presence and strength of pro-social motives. Given that reciprocity and conditional cooperation are important drivers of pro-social behavior, we expect that pro-social motives should be stronger with positive beliefs about self-protection of the other group peer (*H2*). We also expect that the observability of self-protection decisions should increase levels of self-protection due to strategic (i.e., punishment in future rounds) or image concerns. The latter should only be relevant in the Philippine setting because the laboratory experiments in Germany were fully anonymous.

3.3.4 Empirical identification

To test for the fundamental effect of the level of insurance coverage on self-protection (*H1*), we compare treatments I_{low} and I_{high} to the control group *C*. We assess whether there is a potentially positive impact of group insurance on self-protection relative to individual insurance by comparing individual insurance with $G_{private}$. The comparison is repeated separately for those expecting their group peer to invest in self-protection ($G_{private\ pos}$) and those not expecting such behavior ($G_{private\ neg}$) because our theory suggests that this should alter pro-social motives due to reciprocal concerns (*H2*). A focal point of comparison between $G_{private}$ and individual insurance is the low-coverage insurance I_{low}. The reason is that if group insurance is able to attain similar—or even higher—levels of self-protection, there should be a clear efficiency gain: $G_{private}$ leaves substantially lower risk for the individual and requires the same premium payment as insurance I_{low}. Hence, this comparison tests whether insurance coverage can be increased without stimulating moral hazard. Similarly, we also test for the effect of group insurance when self-protection decisions are observable in G_{public}. The potential outcome of each individual in terms of self-protection effort can be formally written to depend on the treatment assignment as follows:

$$(9)\ y_i = \alpha + \beta_1 I_{low,i} + \beta_2 I_{high,i} + \beta_3 G_{private,i} + \beta_4 G_{public,i} + \varepsilon_i,$$

where α denotes the self-protection effort in the control group *C* and $\beta_1, \ldots, \beta_4$ are the changes in self-protection when assigned to treatment I_{low}, I_{high}, $G_{private}$, or G_{public}. The alternative specification we use disentangles the effects of group treatment and self-protection belief as follows:

$$(10)\ y_i = \alpha + \beta_1 I_{low,i} + \beta_2 I_{high,i} + \beta_3 G_{private\ pos,i} + \beta_4 G_{private\ neg,i} + \beta_5 G_{public\ pos,i} + \beta_6 G_{public\ neg,i} + \varepsilon_i,$$

where the subscripts to the treatments $G_{private}$ and G_{public} refer to those subsets that expect their group peer to invest in self-protection (i.e., subscript *pos*) or that do not expect such behavior (i.e., subscript *neg*). The error term ε_i captures other factors of influence. We estimate Equations (9) and (10) using both linear probability and probit models.[16] The randomization of all participants to the treatments implies that estimating the equation results in an unbiased estimate of the average treatment effect of each of the treatments; that is, the error term ε_i is uncorrelated with the treatment indicators. To test for the impact of any remaining covariates of interest, we include an indicator variable for Typhoon Haiyan for the Philippine sample that equals 1 if the data collection took place after it hit our field area in November 2013. We also control for sociodemographic characteristics such as sex, age, income, intellectual capabilities, and risk and ambiguity aversion along with within-game experience for both the Philippine and the German samples.

3.4 Procedures and sample characteristics

3.4.1 Procedures

Field laboratory Philippines: Each of the four treatments and the control setting required different instructions and thus was played in different sessions. We always played four different sessions per village to reduce the likelihood of correlation between village-specific characteristics and treatment assignment. We conducted the experiment with 992 participants in 124 sessions. Each participant played over three control and three treatment rounds, and the initial endowment was restored before every round to avoid differences in wealth among subjects. At the end of each round, subjects were informed of their result. We used play money throughout the experiment to represent the amounts at stake. Before the experiment started, the participants were informed that their decisions in the games would influence their final payout but that only one of the experiment rounds—to be determined randomly—would be paid out in real money.[17] In addition to the experiment, we conducted face-to-face questionnaires to assess basic sociodemographic characteristics along with more complex issues such as intellectual capabilities and risk and ambiguity aversion.

The experimental procedure for one session round was as follows. First, the instructor explained the game to all participants jointly, and each participant received an initial endowment in play money for one round. After the introduction, the participants

[16] In this case of a saturated model (i.e., each possible state represented by a dummy variable), the linear probability estimation is equivalent to a parametric estimation applying a probit link function.
[17] Participants were granted PHP 50 as a show-up fee if they were not able or willing to complete the entire procedure. We made it very clear that all participants could discontinue the experiment at any time; however, there were no dropouts.

answered test questions to demonstrate their understanding of the game. Only when all questions were answered correctly was the participant allowed to continue. The participants were then given the choice between two opaque bags, one with four and one with two orange balls; choosing the latter bag with a reduced loss probability required a payment of 20. Prior to their choice, we elicited beliefs about the self-protection decision of their respective group peer in the group insurance treatments. The participants were not allowed to communicate and thus coordinate their decisions. After the participants made their choice and paid the related price, they drew from the chosen bag to determine their state (i.e., loss or no loss). The result from that round was recorded, and the participant was sent back to his or her seat. In the case of group insurance, the result from one round could be calculated only after both parties to the group insurance contract had determined their losses; thus, these treatments included an additional loop.

Contrary to most economics laboratory experiments, we neither restricted our sample to students nor did we make groups anonymous. The experiment was conducted with rural villagers from the Iloilo and Guimaras provinces of the Philippines in October and November 2013. We applied a two-stage randomization schedule, first by randomly sampling villages and then by selecting participants from complete household lists for the selected villages in the second stage. The pool of villages was restricted to include only rural villages. We also excluded villages located in relatively rich municipalities, thus dropping municipalities with income classes 1 and 2.[18] Permission to conduct the research was obtained in advance from the elected village representative (i.e., the "Punong Barangay") for all villages. We also had full access to village household lists to sample individual participants. Figure 3.2 provides an overview of the geographic allocation of the villages of the Iloilo and Guimaras provinces in which we conducted the experiments.

[18] The definitions of income classes and rural areas are in accordance with those of the Philippine Statistics Authority (Republic of the Philippines 2014). Income classes range from 1 to 5 and are defined by the Department of Finance (Republic of the Philippines 2008).

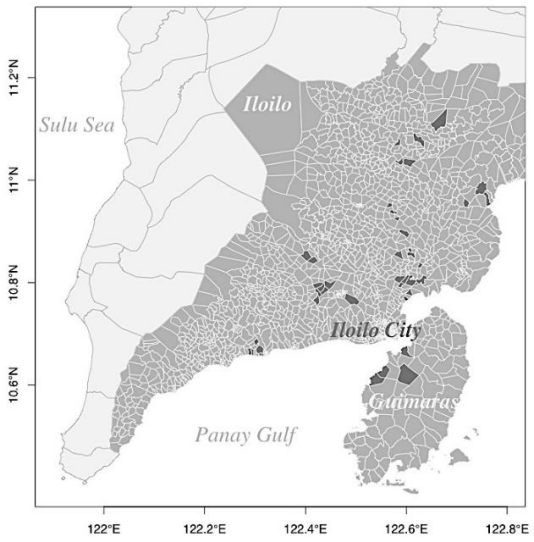

Figure 3.2. Geographic dispersion of experimental villages

Note: The dark gray coloring represents the official territorial areas of the villages in which we conducted the experiments.

The allocation of treatments to specific villages was determined randomly; however, we divided the time sequence (i.e., villages ordered by date of the experiments) into three parts, thus ensuring equal distribution of treatments across those parts. Within the three parts, we designed optimal clusters of villages in terms of similarity with respect to experiment date, village size, wealth, and remoteness. Each of these clusters again featured the same distribution of treatments.[19] We always played four sessions with distinct treatments in each village, thus minimizing the likelihood of correlations between village-level covariates and treatment assignment or order.[20]

In the second stage of our sampling procedure, households were randomly chosen from within a village. We incentivized households to send the household head by awarding an additional PHP 20 to the final payouts in the event of this person's participation; however, spouses were also eligible to participate. We always invited groups of two by asking each invited household member to bring one friend or a close relative. We further required participants to be between 18 and 65 years of age. Our recruiters went to the sampled villages some days prior to the experiment to ensure permission from the village officials to conduct the experiment and to ascertain the availability of facilities for the experiment. To allow for random household selection,

[19] This approach minimizes the Mahalanobis distance of the average village from its cluster average, normalizing the variables of experiment date, village size, wealth, and remoteness using the covariance matrix. The exact calculation and assignment procedure are available upon request.

[20] This typhoon is indicated by international code HAIYAN/TC36/31W/1330. Controlling for the timing of the experiment became especially relevant after Typhoon Haiyan hit the province of Iloilo in November 2013 after 67 of 124 sessions had been conducted.

the recruiters requested access to a complete list of households in the village, from which 16 were randomly selected. The recruiters then delivered invitations to the selected households. Each invitation had one additional invitation letter attached along with a request to invite another person of the invitee's choice.

***Computer laboratory Germany*:** The experimental procedures in the German computer laboratory setting mimicked those implemented in the Philippine field laboratory. The main difference was the interaction with a computer terminal as opposed to an experimenter in the Philippine setting. We conducted the experiments in the experimental laboratories of the University of Mannheim and the University of Magdeburg using the experimental software z-Tree (Fischbacher, 2007) in March and April 2015. Experimental treatments were randomized within each session. Participants were recruited through the subject pools of the respective experimental laboratories, requiring subjects to have a good command of the German language. We conducted the experiment with 700 participants (i.e., 180 from Mannheim and 520 from Magdeburg) in 37 sessions. One notable difference from the Philippine field laboratory resulting from the computer laboratory setting was that players were not able to identify their group peers under the group insurance treatments in the German computer laboratory; however, they were informed that their peer was one of the session's participants.

3.4.2 Sample characteristics

Descriptive statistics of the sample characteristics are presented in Table 3.3. Most of the participants in the Philippine sample were female, and the share of household heads was relatively low. However, almost all of our participants were involved in and responsible for household financial decision-making. The German sample contained a higher share of male participants.

Those younger than 18 and older than 65 were not allowed to participate in the Philippine sample; thus, the average age was slightly below 40. Because the German sample was recruited from a student population, the average age of approximately 23 was lower. With respect to the households' financial situations, the average annual household income in the Philippine sample was approximately PHP 85,000. The average income based on those participants reporting receipt of a daily wage was below the minimum daily wage of PHP 250 in the agricultural sector in the Iloilo province as of October 2013 (Republic of the Philippines 2013). Thus, our Philippine sample represents a typical low-income population. Average annual per capita income in the German student sample was EUR 7,719.

Due to the randomized allocation of treatments, we expect all characteristics to be balanced between the treatments and the control group. Applying multivariate balancing tests accounting for correlations between the treatments and multiple variables, we clearly cannot reject the hypothesis that characteristics have the same average across treatments. Thus, the participants' characteristics are balanced between the treatments and the control group for both the Philippine and the German sample.[21]

3.5 Experimental results

3.5.1 Main results

We show average treatment effects in terms of univariate estimates of average self-protection in Figures 3.3 and 3.4 and in terms of marginal effects from a linear probability model accounting for correlation within our unit of randomization (i.e., the experimental session for the Philippine sample and the individual for the German samples) via clustered standard errors in Tables 3.4 and 3.5.[22] The results are shown separately for each of the two experimental settings, the Philippine field laboratory and the German computer laboratory.

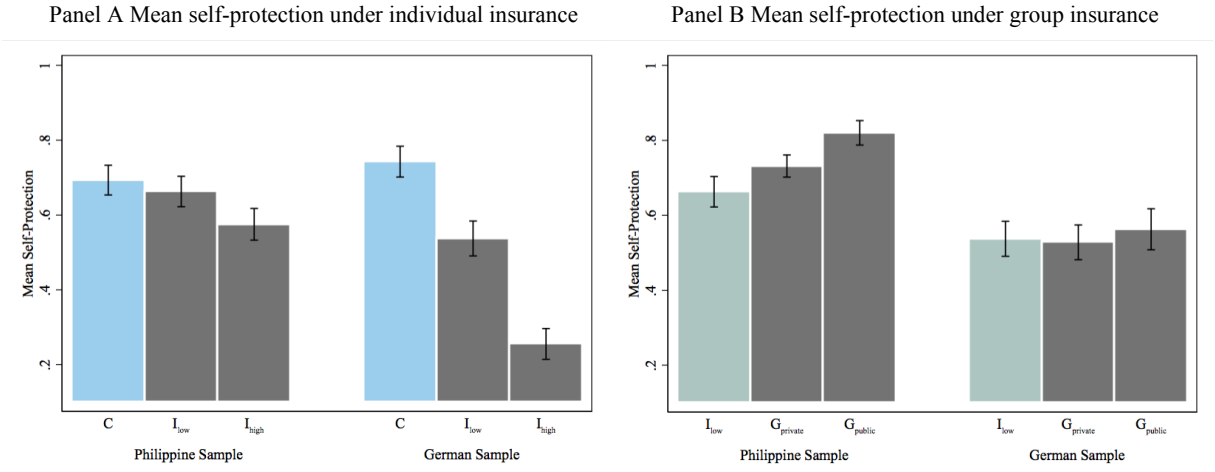

Figure 3.3. Descriptive statistics of mean self-protection by treatment and sample

Notes: The bars represent the mean proportion of individuals choosing self-protection for the control and treatment groups. Error bars indicate standard errors of the mean.

[21] The occurrence of a major natural event in the form of Typhoon Haiyan in the Philippines is an exogenous factor inducing concern about varying impact on our treatment and control groups. Due to our balanced treatment assignment over time, we would not expect such a problem to occur. In Appendix E, we nevertheless provide summary statistics of the sample divided into pre- and post-typhoon samples along with self-reported measures of typhoon exposure for the post-typhoon sample. Again, with a high degree of confidence, we can reject the hypothesis of differences in average characteristics.

[22] We also applied individual-level clusters to the Philippine sample, resulting in smaller standard errors; however, we used the more conservative session-level clustering to maintain consistency with our assumptions in the sample balancing checks (see Section 3.4.2). The results from an alternative probit model estimation are presented in Appendix F; the results from separate estimations of our main model in Table 3.4 for the two German subsamples are presented in Appendix G.

***Hypothesis 1*:** Our primary model of average treatment effects for the Philippine sample in Table 3.4 mirrors the descriptive evidence in Panel A of Figure 3.3. The average probability of an individual investing in self-protection decreases with increasing levels of insurance coverage. In particular, the reduction is 3.1 percentage points ($p = 0.454$) under the low-coverage insurance I_{low} and 11.8 percentage points ($p = 0.0289$) under the high-coverage insurance I_{high}. This is indicative of ex ante moral hazard as expected by our hypothesis *H1*. The effects are robust to the inclusion of covariates in Column (2). A similar pattern with more pronounced effects is observed for the German sample in Column (3), whereas the decrease in average self-protection is 20.5 percentage points ($p = 0.000$) under the low-coverage insurance I_{low} and 48.7 percentage points ($p = 0.000$) under the high-coverage insurance I_{high}.

The effects are significantly higher in the German sample than in the Philippine sample ($p = 0.000$ for I_{high} and $p = 0.0017$ for I_{low}).[23] Again, the results are robust to the inclusion of covariates in Column (4). All results support our hypothesis *H1* and are in line with theory and the empirical literature.

***Hypothesis 2*:** For group insurance, we first show the overall average treatment effect (i.e., including self-interested and pro-social archetypes) represented by the $G_{private}$ dummy in Table 3.4, which mirrors the descriptive evidence in Panel B of Figure 3.3. Here, we find that group insurance induces an increase in self-protection of 6.9 percentage points relative to the individual insurance I_{low} case ($p = 0.0933$) for the Philippine sample. The German sample prima facie does not exhibit this pattern, with the self-protection probability being similar to the individual insurance I_{low} treatment ($p = 0.852$) and 21.5 percentage points lower than without insurance. In summary, the result that group insurance does not decrease self-protection probabilities in the German sample and even increases those in the Philippine sample implies efficiency gains because group insurance effectively provides higher insurance coverage than does individual insurance with low coverage I_{low} through the feature of loss sharing below the deductible.

We observe similar results when self-protection decisions are observable within the group under the G_{public} treatment, whereas in the Philippine sample, self-protection proportions are higher than in the standard non-observable case $G_{private}$ ($p = 0.0429$) and not different in the German sample ($p = 0.511$). This is reasonable because in addition to strategic concerns (i.e., punishment in future rounds) that are relevant in

[23] To test for differences between regression coefficients resulting from the Philippine and the German sample populations, we estimated seemingly unrelated regressions (SUR) and subsequent Wald test statistics.

both settings, the Philippine setting allows for further image concerns resulting from the non-anonymity of the participants.

In Figure 3.4 and Table 3.5, we interact the group insurance treatments $G_{private}$ and G_{public} with the belief about the group peer's self-protection decision. The positive results for group insurance are even more favorable if we condition the group insurance treatments on positive beliefs about the group peer's self-protection decision. We furthermore find that differences in the distribution of beliefs across the two samples can explain differences in the average performance of the group insurance scheme. In particular, for the Philippine sample, we observe that 80 percent of participants believe that their group peer will invest in self-protection, whereas for the German sample, only 55 percent share such beliefs.[24]

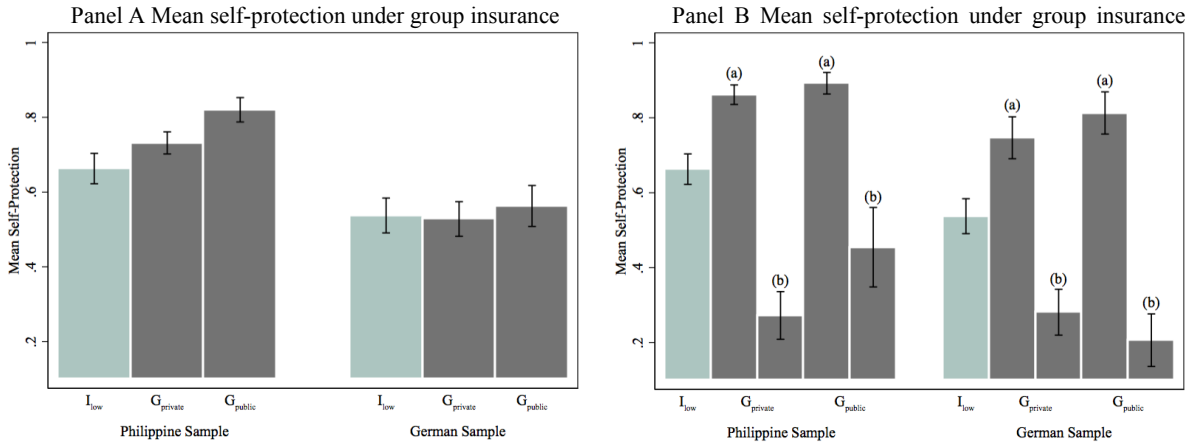

Figure 3.4. Descriptive statistics of mean self-protection by treatment, sample, and beliefs

Notes: The bars represent the mean proportion of individuals choosing self-protection for the control and treatment groups. We differentiate the group insurance treatments $G_{private}$ and G_{public} into those subjects expecting their group peer to invest in self-protection (a) and those not expecting this (b) in Panel B. Error bars indicate standard errors of the mean.

Conditioning on self-protection beliefs, the patterns are remarkably similar between the Philippine and the German sample. When individuals exhibit positive self-protection beliefs ($G_{private\ pos}$), self-protection relative to the low-coverage individual insurance increases by 19.9 percentage points (p = 0.000) in the Philippine sample, whereas in the German sample, we observe an increase of 20.9 percentage points (p = 0.0001). The effect is reversed if individuals exhibit negative self-protection beliefs. Here, self-protection probabilities clearly drop below those observed under individual

[24] This difference might also be due to the non-anonymity of groups in the Philippines and closer relations between Filipino villagers compared to German students.

insurance I_{low} and are more consistent with selfish behavior. The observability of self-protection only seems to play a role for those with negative self-protection beliefs under the non-anonymous setting in the Philippines. This finding suggests that especially those with low pro-social motivations behave strategically under observability and that strategic concerns are mainly driven by image concerns in the non-anonymous setting.

In summary, our data from both samples provide evidence of a consistent positive impact of group insurance on incentivizing self-protection relative to individual insurance for those with positive self-protection beliefs. This finding is in line with our conditional cooperation hypothesis *H2* and suggests that the level of pro-sociality γ is driven by reciprocal concerns.[25] Those with negative beliefs about peers under group insurance are more likely to apply a self-interested preference concept (i.e., $\gamma = 0$), which is what our theory predicts. In general, the result that group insurance on average achieves at least similar levels of self-protection compared to individual insurance is remarkable and implies an efficiency increase in the provision of insurance and thus social welfare. Even more promising is that group insurance serves as a condition under which insurance and self-protection can be complements rather than substitutes if individuals believe that group peers contribute to the public good self-protection.

In terms of theory, we find that our model that incorporates pro-social preferences introduced in Section 3.2.4 provides high explanatory power for the high (low) proportions of self-protection observed under group insurance with positive (negative) self-protection beliefs. Assuming that everyone with positive beliefs behaves according to one of the pro-social archetypes, the range of predicted self-protection proportions in the Philippines includes the actually observed proportions. In the German sample, observed self-protection is slightly below the model predictions. In particular, depending on the specific pro-social concept used, we would predict the share of self-protection for those with positive self-protection beliefs to be in the range between 71 and 93 percent for the Philippine sample and between 91 and 98 percent for the German sample. The actual observed shares in the experiments are 86.1 percent ($G_{private\ pos}$) and 89.2 percent ($G_{public\ pos}$) in the Philippine sample and 74.7 percent ($G_{private\ pos}$) and 81.3 percent ($G_{public\ pos}$) in the German sample. One possible explanation is that the anonymous German computer lab setting leads to lower levels of pro-social motives even if beliefs about group peers are positive.

[25] Whereas reciprocity (Fehr and Gächter 2000a, b) or conditional cooperation (Fischbacher, Gächter and Fehr 2001) can be considered a motivation on its own, it is also consistent with preferences to conform to a social norm (Messick 1999) or with fairness preferences as represented by altruism (Fehr and Fischbacher 2003) or inequity aversion (Fehr and Schmidt 1999).

3.5.2 Game Dynamics

To judge whether individuals act consistently over the experiment rounds and according to theory, we examine the impact of game history on decisions. Despite the fact that we provide subjects with exact probabilities attached to the states of the world (i.e., loss or no loss) and that, consequently, there is no need to update beliefs about probabilities across rounds based on observed losses, subjects might apply a subjective or Bayesian approach to probability. The fundamental idea of subjective probability is that individuals form degrees of belief in the occurrence of an event (de Finetti, 1937; de Finetti, 1970; Savage, 1971). In this setting, past realizations of an event affect beliefs about future realizations. As subjects move through the multiple rounds of our experiment, they gather experience on the consequences of their choices. The information set available is thus dynamic and depends on previous rounds' decisions and outcomes. In Table 3.6, we derive estimates of previous rounds' self-protection decisions, shock experience, and their interactions.[26]

The results are, again, remarkably consistent between the Philippine and the German sample. As we would expect, the more losses a subject experienced in previous rounds, the higher the likelihood of investing in self-protection in the current round. Experiencing one additional loss increases the likelihood of investing in self-protection by 6.9 percentage points for the Philippine and 17.6 percentage points for the German sample. Interestingly, this only holds when shocks are experienced without self-protection. When interacting self-protection and loss experience, we find that loss experiences under self-protection completely (Philippines) or partially (Germany) offset the positive effect mentioned previously.

This finding is in line with theoretical results by Briys and Schlesinger (1990), who state that an increase in self-protection does not necessarily reduce the riskiness of the final wealth distribution because the cost of self-protection makes the worst possible outcome even worse, whereas only the probability of the worst possible outcome is reduced. It seems that experiencing a loss under self-protection makes this aspect more salient and hence reduces the willingness to invest in self-protection compared with shock experience without self-protection. Our findings are also consistent with disappointment aversion (Gul, 1991; Gill and Prowse, 2012). We furthermore observe that the more often the self-protection option has been selected in the past, the more likely subjects are to invest in self-protection in the current round. This clear

[26] These covariates all depend on self-protection decisions in the past and are thus endogenous to the treatment status. If self-protection decisions are auto-correlated, these endogenous controls also bias the treatment effect estimates downward, which we observe. However, our main point here is to illustrate the correlation of experience with current decisions, not to increase the precision of the treatment effect estimates.

correlation of decisions across rounds is not surprising given that we expect certain risk-aversion types to make consistent decisions.

3.6 Conclusions

This paper finds evidence in support of the theoretical prediction of a reduction in the likelihood of investing in self-protection when insurance coverage is present—i.e., ex ante moral hazard—providing empirical confirmation that insurance coverage and self-protection are substitutes. A widely used measure to address this substitution effect is limiting the available range of insurance coverage through deductibles. However, this approach results in efficiency losses because the optimal level of insurance coverage desirable in the absence of ex ante moral hazard is not achievable.

We thus test an alternative approach in which multiple individuals are covered under a group insurance policy and share losses below a deductible. A central finding is that limited joint liability in these group insurance schemes incentivizes investment in self-protection beyond what is expected from traditional economic models. We show theoretically and empirically that pro-social preferences under the group insurance scheme alleviate the ex ante moral hazard condition. In particular, the findings suggest that many individuals act as conditional cooperators, reciprocating positive beliefs about peers with pro-social behavior. Our results thus show that group insurance is an instrument for which insurance and self-protection can either be complements or substitutes depending on the degree of pro-social concerns but that, on average, group insurance and self-protection are not necessarily substitutes.

Our results have implications for the efficient provision of insurance and the design of other contracts under risk. Whereas ex ante moral hazard under individual insurance can often only be contained by limiting insurance coverage, group insurance seems to simultaneously offer substantial room for high insurance coverage and self-protection. This finding implies a possible efficiency increase in the provision of insurance and thus increases in social welfare. In a low-income economy context, our results support recommendations to target insurance to groups of individuals, such as an entire village, a producer group, or a cooperative, rather than to individuals (Cole et al. 2013). Our group insurance approach also mirrors recent innovations in developed insurance markets utilizing “peer-to-peer” concepts such as Friendsurance (Germany), Hey Guevara (United Kingdom), and PeerCover (New Zealand).

Although our empirical findings are derived from an insurance experiment, in principle, our theoretical arguments can be generalized to moral hazard in other

settings. Whenever individuals are risk-averse and face state-contingent contracts that are meant to induce effort, joint liability in pro-social groups might improve the welfare of individuals without decreasing incentives to provide effort. This might be relevant, for example, for the design of bonus schemes in teams conditioned on the successfulness of projects or rewards for accident prevention in the workplace.

Possible limitations of this work should be considered. First, we analyzed groups of two; it is not clear how the results would change with larger groups. Although the individual residual risk is reduced with increasing group size, incentives for self-protection of self-interested individuals should also decrease (Appendix A), and it is not clear whether pro-social preferences can maintain high levels of self-protection under these circumstances. In particular, positive beliefs and pro-sociality might diffuse once groups become too large. Recent field and experimental evidence, however, suggests that the actual size of the exposure to economic losses experienced by others is not particularly essential to aligning incentives (Engel, 2014; Giné and Karlan, 2014). Additionally, our results suggest that positive beliefs are key to the efficiency of the group scheme and that, otherwise, even decreases in self-protection are possible. Thus, targeting group schemes to settings without sufficient mutual concern and trust might decrease rather than increase the efficiency of insurance solutions.

There is room for future theoretical and empirical research. An important precondition for the application of pro-social preference concepts in this context is the extension of those models to situations under risk. The generalization of these models to risky environments currently constitutes a gap in the literature. Moreover, it is not clear whether the effects of group contracts on ex ante moral hazard can be generalized to ex post moral hazard. Finally, more work can be performed to support the external validity and generalizability of our empirical findings. Observations from real-world insurance pools and rigorous field experimentation are still missing and necessary.

3.7 Tables

Table 3.1: Experimental treatment plan

Panel A: Universal parameters					
Initial endowment	300				
Loss	200				
Self-protection cost	20				
Loss probability ex self-protection	0.40				
Loss probability cum self-protection	0.20				
Panel B: Treatment characteristics					
		Individual insurance		Group insurance	
	C	I_{low}	I_{high}	$G_{private}$	G_{public}
Panel B.1: Treatment-specific parameters					
Deductible	–	100	40	100	100
Premium	–	50	80	50	50
Self-protection observable	No	No	No	No	Yes
Panel B.2: Treatment-specific expected values					
Expected value change from self-protection	*+20*	*0*	*-12*	*-10*	
Standard deviation change from self-protection	*-18*	*-9*	*-4*	*-4*[a]	
Panel B.3: Treatment sequence					
Rounds 1 to 3	C	C	C	C	C
Rounds 4 to 6	C	I_{low}	I_{high}	$G_{private}$	G_{public}
Panel B.4: Participants and sessions					
Number of participants (Philippines)	175	176	175	288	178
Number of participants (Germany)	147	149	147	151	106
Number of sessions (Philippines)	22	22	22	36	22
Number of sessions (Germany)	37	35	37	20	16

Notes: All values are presented either in PHP (i.e., Philippine sample) or laboratory currency (i.e., German sample), exchangeable to Euro with an exchange rate of 20:1. [a] The standard deviation under group insurance depends on both agents' decisions, and we show standard deviation under the assumption that the group peer invests in self-protection. If the group peer does not invest in self-protection, the decrease in standard deviation from self-protection is slightly lower at 3.

Table 3.2: Theoretical predictions for self-protection with different pro-social concepts

	C	I_{low}	I_{high}	G		
Panel A: Preference concept						
Pro-social	No	No	No	No[a]	Yes[a]	Yes[a]
γ	–	–	–	0	1	1
ρ	–	–	–	keep	keep	adapt
Panel B: Risk-aversion parameter ρ domain for which self-protection is preferred						
Philippines	[-3.1, 3.9]	[0.0, 4.0]	⌀	A: ⌀ B: ⌀	A: [0.0, 8.3] B: [0.0, 8.5]	A: [-0.6, 16.0] B: [-0.6, 16.4]
Germany	[-3.1, 3.9]	[0.0, 4.0]	⌀	A: ⌀ B: ⌀	A: [0.0, 8.3] B: [0.0, 8.5]	A: [-1.2, 14.2] B: [-1.9, 14.8]
Panel C: Share of population for which self-protection is preferred						
Philippines	0.82	0.64	0	0	A/B: 0.71	A/B: 0.93
Germany	0.85	0.81	0	0	A/B: 0.91	A/B: 0.98

Notes: Simulations procedures are described in Section 3.2.5. [a] A: parameter range for $e_j = 1$; B: parameter range for $e_j = 0$.

Table 3.3: Summary statistics and balancing checks

				Philippine sample		
Variable	**C**	**I_{low}**	**I_{high}**	**$G_{private}$**	**G_{public}**	**Equality of means (p-value)**[e]
			Mean [a] *(SD)*			
Panel A: Sociodemographic characteristics						
Sex (1=female)	0.869 (0.131)	0.818 (0.180)	0.829 (0.166)	0.868 (0.133)	0.848 (0.154)	0.688
Age (in years)	38.049 (4.321)	38.0568 (4.811)	37.488 (3.100)	39.729 (3.604)	38.839 (4.496)	0.263
Financial responsibility[b]	0.972 (0.0536)	0.972 (0.0536)	0.988 (0.0395)	0.969 (0.055)	0.966 (0.0688)	0.697
Household annual income (in 1,000 PHP or EUR)	74.867 (34.143)	65.236 (27.107)	90.588 (93.284)	89.449 (61.062)	96.241 (141.547)	0.683
Panel B: Mental capabilities, risk and ambiguity aversion						
Numeracy performance (percent correct)	0.480 (0.0712)	0.466 (0.062)	0.483 (0.065)	0.493 (0.0515)	0.461 (0.0683)	0.325
Ambiguity aversion[c]	6.347 (0.351)	6.243 (0.304)	6.403 (0.346)	6.429 (0.354)	6.388 (0.331)	0.347
Risk aversion[d]	3.838 (0.745)	3.716 (0.570)	3.745 (0.631)	3.642 (0.676)	3.883 (0.697)	0.692
Equality of means (p-value)[e]		0.834	0.802	0.567	0.972	0.729
Number of participants	175	176	175	288	178	

				German sample		
Variable	**C**	**I_{low}**	**I_{high}**	**$G_{private}$**	**G_{public}**	**Equality of means (p-value)**[e]
			Mean [a] *(SD)*			
Panel A: Sociodemographic characteristics						
Sex (1=female)	0.190 (0.394)	0.181 (0.387)	0.163 (0.371)	0.225 (0.419)	0.123 (0.330)	0.305
Age (in years)	23.755 (4.102)	23.195 (3.564)	23.463 (3.957)	23.166 (3.340)	23.481 (2.616)	0.618
Financial responsibility[b]	0.544 (0.500)	0.503 (0.502)	0.470 (0.501)	0.556 (0.499)	0.462 (0.501)	0.415
Household annual income (in 1,000 PHP or EUR)	7.427 (4.448)	7.968 (3.729)	7.908 (4.675)	7.636 (3.181)	7.628 (2.786)	0.749
Panel B: Mental capabilities, risk and ambiguity aversion						
Numeracy performance (percent correct)	0.804 (0.205)	0.825 (0.192)	0.806 (0.210)	0.765 (0.239)	0.787 (0.214)	0.166
Ambiguity aversion[c]	5.290 (0.916)	5.404 (0.846)	5.339 (0.926)	5.368 (1.021)	5.436 (0.834)	0.733
Risk aversion[d]	3.163 (1.304)	3.013 (1.214)	3.259 (1.147)	3.066 (1.181)	3.085 (1.288)	0.467
Equality of means (p-value)[e]		0.220	0.664	0.458	0.440	0.589
Number of participants	147	149	147	151	106	

Notes: We provide pooled results for two German subsamples. We tested for differences between the two subsamples and only found significant differences for financial responsibility and income, with slightly higher values for the income variable in the Mannheim sample (p = 0.0904) and slightly higher values for the financial responsibility variable in the Magdeburg sample (p = 0.00620). [a] Asterisks indicate the significance levels of the differences in means relative to the control group *C* based on clustered session-level standard errors, which are reported in parentheses. [b] Indicator variable in which 1 indicates responsibility for financial decision-making in the household. [c] Scores are based on multiple seven-point Likert scale questionnaire items, where 7.00 indicates strong accordance; e.g., a score of 7.00 (1.00) indicates high (low) ambiguity aversion. [d] We used the approach introduced by Binswanger (1980) in the form of the Barr and Genicot (2008) implementation; details are presented in Appendix D. [e] We report p-values for multivariate equality in means tests based on Wilks's lambda test statistics.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3.4: Linear probability models for self-protection

	Philippine sample		German sample	
Independent variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Panel A: Average treatment effects				
I_{low}	-0.0305	-0.0297	-0.205***	-0.212***
	(0.0405)	(0.0386)	(0.046)	(0.0455)
I_{high}	-0.118**	-0.115**	-0.487***	-0.485***
	(0.0534)	(0.0516)	(0.0425)	(0.0424)
$G_{private}$	0.0381	0.0256	-0.215***	-0.219***
	(0.0405)	(0.0403)	(0.0463)	(0.0465)
G_{public}	0.127***	0.124***	-0.180***	-0.181***
	(0.0433)	(0.0409)	(0.0488)	(0.0487)
Intercept	0.693***	0.370***	0.743***	0.610***
	(0.0286)	(0.134)	(0.0291)	(0.149)
Panel B: Control variables				
Sociodemographic	No	Yes	No	Yes
Risk and ambiguity	No	Yes	No	Yes
Mental capabilities	No	Yes	No	Yes
Game rounds	No	Yes	No	Yes
Typhoon	No	Yes	No	No
Panel C: Model				
Observations[a]	2,976	2,973	2,076	2,076
R^2	0.028	0.042	0.102	0.111
R^2 adj.	0.027	0.037	0.100	0.106

Notes: The linear probability OLS models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the session level for the Philippine sample and at the individual level for the German sample and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Individual sociodemographic control variables include the following: sex, age, whether the subject is responsible for household financial decision-making, and annual income. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks. Results including regression coefficients for all control variables are provided in Appendix H.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3.5: Linear probability models for self-protection (with belief)

	Philippine sample		German sample	
Independent variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Panel A: Average treatment effects				
I_{low}	-0.0305	-0.0311	-0.205***	-0.213***
	(0.0405)	(0.0388)	(0.046)	(0.0458)
I_{high}	-0.118**	-0.115**	-0.487***	-0.485***
	(0.0534)	(0.0517)	(0.0425)	(0.0425)
$G_{private\ pos}$	0.168***	0.156***	0.00431	0.00306
	(0.0346)	(0.034)	(0.0505)	(0.0506)
$G_{private\ neg}$	-0.421***	-0.426***	-0.462***	-0.472***
	(0.0591)	(0.0569)	(0.0499)	(0.0499)
$G_{public\ pos}$	0.199***	0.196***	0.0703	0.0682
	(0.0378)	(0.0358)	(0.0467)	(0.0463)
$G_{public\ neg}$	-0.239***	-0.236***	-0.536***	-0.533***
	(0.0857)	(0.0842)	(0.0498)	(0.0495)
Intercept	0.693***	0.461***	0.743***	0.691***
	(0.0286)	(0.123)	(0.0292)	(0.138)
Panel B: Control variables				
Sociodemographic	No	Yes	No	Yes
Risk and ambiguity	No	Yes	No	Yes
Mental capabilities	No	Yes	No	Yes
Game rounds	No	Yes	No	Yes
Typhoon	No	Yes	No	No
Panel C: Model				
Observations[a]	2,976	2,973	2,076	2,076
R^2	0.134	0.143	0.203	0.213
R^2 adj.	0.132	0.139	0.201	0.207

Notes: The linear probability OLS models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the session level for the Philippine sample and at the individual level for the German sample and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Individual sociodemographic control variables include the following: sex, age, whether the subject is responsible for household financial decision-making, and annual income. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks. Results including regression coefficients for all control variables are provided in Appendix H.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3.6: Probit models for self-protection and game history

	Philippine sample		German sample	
Independent variables	(1) Probit	(2) Probit	(3) Probit	(4) Probit
Panel A: Average treatment effects				
I_{low}	-0.0167	-0.018	-0.141***	-0.136***
	(0.0205)	(0.0206)	(0.029)	(0.0293)
I_{high}	-0.0518*	-0.0510*	-0.289***	-0.283***
	(0.0272)	(0.0269)	(0.0255)	(0.025)
$G_{private\ pos}$	0.0930***	0.0924***	-0.0337	-0.0363
	(0.0238)	(0.0241)	(0.0372)	(0.0356)
$G_{private\ neg}$	-0.174***	-0.176***	-0.259***	-0.270***
	(0.0344)	(0.0338)	(0.0323)	(0.0321)
$G_{public\ pos}$	0.165***	0.163***	0.0481	0.0485
	(0.0318)	(0.0309)	(0.0353)	(0.0343)
$G_{public\ neg}$	-0.0516	-0.0578	-0.307***	-0.302***
	(0.0439)	(0.0449)	(0.04)	(0.0398)
Panel B: Game history and control variables				
Cumulative	0.160***	0.161***	0.198***	0.200***
self-protection decisions	(0.00551)	(0.00548)	(0.0152)	(0.0146)
Cumulative	0.0685***	0.0706***	0.176***	0.167***
losses	(0.0122)	(0.0123)	(0.0249)	(0.0236)
Cumulative losses	-0.107***	-0.111***	-0.104***	-0.0983***
under self-protection	(0.018)	(0.0179)	(0.0356)	(0.0335)
Sociodemographic	No	Yes	No	Yes
Risk and ambiguity	No	Yes	No	Yes
Mental capabilities	No	Yes	No	Yes
Game rounds	Yes	Yes	Yes	Yes
Typhoon	Yes	Yes	No	No
Panel C: Model				
Observations[a]	2,976	2,976	2,076	2,076
logLik	-1,126	-1,120	-762.2	-744.7

Notes: The probit models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. The results are provided in terms of marginal effects. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the session level for the Philippine sample and at the individual level for the German sample and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Individual sociodemographic control variables include the following: sex, age, whether the subject is responsible for household financial decision-making, and annual income. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix A

Incentive for self-protection under group insurance for $n > 2$

With *n* as the number of other peers in the group and *k* as the number of losses in the group, Equation (3) can be generalized to:

$$\text{(A1)} \quad -p'(e)\sum_{k=0}^{n} p_k^{-i}(U_{0k} - U_{1k}),$$

where p_k^{-i} is the probability that *k* of the *n* other peers experience a loss causing the deductible payment to be shared. U_{zk} is the utility derived in state *z* if *k* others experience a loss:

$$\text{(A2)} \quad U(Y_{zk}) = U(W - e - c(L - D) - \frac{k+1_{z=1}}{n+1}D).$$

It is easy to see that $U(Y_{1k}) = U(Y_{0k+1})$ such that the utility gain of self-protection is divided into $n + 1$ "steps" of equal size $\frac{1}{n+1}D$ along the utility function; that is, the entire domain between $\underline{Y} = W - e - c(L - D) - D$ and $\overline{Y} = W - e - c(L - D)$ is covered, and each step is weighted with the probability that it realizes. The sum in (A1) can be decomposed into marginal utility gains, each weighted with the probability that the gain of not suffering a loss covers this domain:

$$\text{(A3)} \quad -p'(e_i)\int_{x=\underline{Y}}^{\overline{Y}} p^{-i}(x)U'(x)\,dx.$$

$U'(.)$ is the first derivative of $U(.)$, assumed to exist and to be strictly positive. $p^{-i}(x)$ is the weighting factor and is defined as the probability that *k* losses realize such that *x* is element of the resulting "gain step" such that $p^{-i}(x) = p_k^{-i}$ where $k = floor\left(\frac{(n+1)(\overline{Y}-x)}{D}\right)$. Specifically, it is the probability that $k = floor\left(\frac{(n+1)(\overline{Y}-x)}{D}\right)$. The following are examples:

$$n = 0 \Rightarrow p^{-i}(x) = 1$$
$$n = 1 \Rightarrow p^{-i}(x) = \begin{cases} p_j & for\ x \in [\underline{Y}, \underline{Y} + \frac{1}{2}D) \\ (1 - p_j)\ for\ x \in [\underline{Y} + \frac{1}{2}D, \overline{Y}] \end{cases}$$

Hence, the probability distribution for $k \in \{0,1,\dots,n+1\}$ is rescaled to lie in $n + 1$ equally sized bins in the range $[\underline{Y}, \overline{Y}]$. With increasing *n*, the probabilities for each bin tend to decrease and its number increases such that $\sum_{k=0}^{n} p_k^{-i} = 1$ always holds. With

the rescaling, however, bin width decreases to $\frac{D}{n+1}$, and the total probability mass on the interval $\left[\underline{Y},\overline{Y}\right]$ decreases accordingly. Assuming, for example, risk neutrality (i.e., constant $U'(x)$), Equation (A3) implies that the marginal benefit of self-protection is proportional to $\frac{1}{n+1}$.[28]

Assuming that p_j is constant across j and losses are drawn independently, the proportion of group members experiencing a loss converges to a normal distribution. If we rescale to the interval $[0,1]$, regarding the proportions of D to be paid by each group member, we know that the normal distribution (1) must have a mean always at p_j, (2) loses mass with $\frac{1}{n+1}$, and (3) the standard deviation is $\sqrt{\frac{(1-p_j)p_j}{n}}$. We can thus approximate the distribution of $p^{-i}(x)$ with an adapted normal distribution of the following functional form:

$$\text{(A4)}\quad \frac{1}{n+1}\varphi\left(p_j,\sqrt{\frac{(1-p_j)p_j}{n}}\right)=\frac{\sqrt{n}}{n+1}\frac{1}{\sqrt{(1-p_j)p_j\sqrt{2\pi}}}\left(e^{-\frac{(x-p_j)^2}{2(1-p_j)p_j}}\right)^n.$$

It is possible to show that the adapted distribution at $N>n$ is strictly smaller:

$$\text{(A5)}\quad \frac{\sqrt{n}}{n+1}\frac{1}{\sqrt{(1-p_j)p_j\sqrt{2\pi}}}\left(e^{-\frac{(x-p_j)^2}{2(1-p_j)p_j}}\right)^n > \frac{\sqrt{N}}{N+1}\frac{1}{\sqrt{(1-p_j)p_j\sqrt{2\pi}}}\left(e^{-\frac{(x-p_j)^2}{2(1-p_j)p_j}}\right)^N$$

$$\Leftrightarrow \sqrt{\frac{n}{N}}\cdot\frac{N+1}{n+1} > \underbrace{\left(e^{-\frac{(x-p_j)^2}{2(1-p_j)p_j}}\right)^{N-n}}_{<1}.$$

Statement A5 holds true because the left-hand side is greater than one. This can be shown by defining $N=n+\delta$ with $\delta>0$, drawing everything inside the square root, multiplying out all terms and comparing the numerator and denominator. Hence, once n is large enough such that the proportion of group members with a loss can be approximated by a normal distribution, the weighting function $p_N^{-i}(x)<p_n^{-i}(x)$ for all $x\epsilon\left[\underline{Y},\overline{Y}\right]$ whenever $N>n$. This implies that the benefit of self-protection calculated in (A3) strictly decreases in n irrespective of the shape of $U(.)$.

[28] The exact relationship with n largely depends on the shape of the utility function.

Appendix B

Rabin's (1993) fairness model and the degree of pro-social concerns

Rabin (1993) develops a framework for incorporating the conditionality of pro-social behavior. The basic idea is that the utility of agent *i* that is derived from fairness or kindness toward *j* positively depends on the expected fairness of *j*. When transferring this concept to our setting, fairness $f(e_i, e_j)$ depends on the self-protection efforts of both agents. Because the self-protection of *j* is not known ex ante, it has to be replaced by beliefs. Following the idea of Rabin (1993), let $\tilde{e}_i$ denote the first-order belief of *i* about e_j. Similarly, the second-order belief $\tilde{\tilde{e}}_i$ can be defined as *i*'s belief about *j*'s belief about e_i (i.e., *i*'s belief about $\tilde{e}_j$). Player *i*'s kindness toward *j* is then $f_i(e_i, \tilde{e}_i)$, and *i's* belief about the fairness of *j* is $\tilde{f}_j(\tilde{e}_i, \tilde{\tilde{e}}_i)$. In contrast to Rabin (1993) and Falk and Fischbacher (2006), outcomes are not deterministic in this paper. We thus define E as the expectation operator over the lottery outcomes resulting from both self-protection decisions and replace deterministic outcomes with these expectations. The kindness of *i* to *j* is given as follows:

$$\text{(B1) } f_i(e_i, \tilde{e}_i) = \frac{E_j(\tilde{e}_i, e_i) - E_j^{eq}(\tilde{e}_i)}{E_j^h(\tilde{e}_i) - E_j^l(\tilde{e}_i)},$$

whereas $E_j^{eq}(\tilde{e}_i)$ is the "expected equitable payoff" defined as $E_j^{eq}(\tilde{e}_i) = \left[E_j^h(\tilde{e}_i) + E_j^l(\tilde{e}_i)\right]/2$ with $E_j^h(\tilde{e}_i)$ individual *j*'s highest payoff given $\tilde{e}_i$ and $E_j^l(\tilde{e}_i)$ individual *j*'s lowest payoff given $\tilde{e}_i$. In other words, the kindness of *i* is the (normalized) extent to which the expected payoff of *j* deviates from the average between what would follow from the most and the least kind action of *i*. Individual *i's* belief about the kindness of *j* is similarly given by:

$$\text{(B2) } \tilde{f}_j(\tilde{e}_i, \tilde{\tilde{e}}_i) = \frac{E_i(\tilde{\tilde{e}}_i, \tilde{e}_i) - E_i^{eq}(\tilde{\tilde{e}}_i)}{E_i^h(\tilde{\tilde{e}}_i) - E_i^l(\tilde{\tilde{e}}_i)}.$$

The two notions of kindness enter the utility function of *i* in addition to the component driven by self-interest in the following way:

$$\text{(B3) } \tilde{f}_j(\tilde{e}_i, \tilde{\tilde{e}}_i) \cdot [1 + f_i(e_i, \tilde{e}_i)].$$

Thus, the additional pro-social incentive to invest in self-protection comes from the marginal effect of e_i on equation B3, which clearly depends on beliefs about player *j*'s self-protection $\tilde{e}_i$. In particular, holding everything else constant, $\tilde{f}_j(\tilde{e}_i, \tilde{\tilde{e}}_i)$ is an increasing function of $\tilde{e}_i$ (compare Equation B2), whereas $\delta f_i(e_i, \tilde{e}_i)/\delta e_i$ is not

affected by a change in $\tilde{e}_i$.[29] This means that the marginal utility derived by the additional pro-social concern necessarily increases in the belief about player *j*'s self-protection $\tilde{e}_i$.

Returning to our utility specification, the pro-social concern of player *i* depends on γ_i. The higher γ_i, the higher the (pro-social) marginal return is from increasing self-protection e_i. Hence, following the spirit of Rabin (1993), γ_i should be an increasing function of beliefs about *j*'s self-protection effort $\tilde{e}_i$.

[29] This is because $f_i(e_i, \tilde{e}_i)$ normalizes the effect of changinge_i, which, especially in our binary case, leads to a constant effect $f_i(1, \tilde{e}_i) - f_i(0, \tilde{e}_i) = 1$.

Appendix C

Non-separability and separability of utility

We assume that i cares for both Y_i and—to the degree γ—Y_j and that utility is either non-separable with $U_i(Y_{z,i}, Y_{z,j}, \gamma) = U_i(Y_{z,i} + \gamma \cdot Y_{z,j})$ or separable with $U_i(Y_{z,i}, Y_{z,j}, \gamma) = U_i(Y_{z,i}) + \gamma \cdot U_i(Y_{z,j})$. Equation (7) then becomes either (C1A) for the non-separable case or (C1B) for the separable case as follows:

$$\text{(C1A)} \quad -p'(e_i)\begin{bmatrix} p_j\left(U_i(Y_{01,i} + \gamma \cdot Y_{01,j}) - U_i(Y_{11,i} + \gamma \cdot Y_{11,j})\right) \\ +(1-p_j)\left(U_i(Y_{00,i} + \gamma \cdot Y_{00,j}) - U_i(Y_{10,i} + \gamma \cdot Y_{10,j})\right)\end{bmatrix},$$

$$\text{(C1B)}$$

$$-p'(e_i)\begin{bmatrix} p_j\left(\left(U_i(Y_{01,i}) + \gamma \cdot U_i(Y_{01,j})\right) - \left(U_i(Y_{11,i}) + \gamma \cdot U_i(Y_{11,j})\right)\right) \\ +(1-p_j)\left(\left(U_i(Y_{00,i}) + \gamma \cdot U_i(Y_{00,j})\right) - \left(U_i(Y_{10,i}) + \gamma \cdot U_i(Y_{10,j})\right)\right)\end{bmatrix}.$$

With $\gamma = 0$, both expressions reduce to Equation (4) without pro-social concerns. With $\gamma > 0$, however, the marginal benefits from self-protection increase. The marginal costs of self-protection under group insurance and pro-social preferences resulting from Equation (2) can be represented as follows:

$$\text{(C2)} \quad p_i p_j U'(Y_{11,i}, Y_{11,j}) + p_i(1-p_j)U'(Y_{10,i}, Y_{10,j}) + (1-p_i)p_j U'(Y_{01,i}, Y_{01,j}) \\ +(1-p_i)(1-p_i)U'(Y_{00,i}, Y_{00,j}).$$

Group insurance allows some of the weight to be shifted between the marginal utilities at the low-wealth point Y_{11} and the high-wealth point Y_{00}, whereas weight is simultaneously shifted between equal-wealth points Y_{01} and Y_{10} depending on the other agent *j's* self-protection decision. In particular, if j invests effort $e_j > 0$ in self-protection to reduce p_j, this puts more weight on the high-wealth point Y_{00} in exchange for less weight on the low-wealth point Y_{11}. For risk-neutral types, this has no effect on marginal costs for both the separability and the non-separability of utility, whereas for risk-averse individuals with $U''(.) < 0$, it reduces marginal costs. The effect is enforced with increasing levels of pro-sociality γ, but differently for the two utility specifications considered. Consider the following representation of Equation (8) for the non-separable (C3A) and for the separable (C3B) cases:

$$\text{(C3A)} \quad p_i p_j U'(Y_{11,i} + \gamma Y_{11,j}) + p_i(1-p_j)U'(Y_{10,i} + \gamma Y_{10,j}) \\ +(1-p_i)p_j U'(Y_{01,i} + \gamma Y_{01,j}) + (1-p_i)(1-p_j)U'(Y_{00,i} + \gamma Y_{00,j}),$$

$$\text{(C3B)}\ \ p_i p_j\left[U'\left(Y_{11,i}\right)+\gamma U'\left(Y_{11,j}\right)\right]+p_i\left(1-p_j\right)\left[U'\left(Y_{10,i}\right)+\gamma U'\left(Y_{10,j}\right)\right]$$
$$+(1-p_i)p_j\left[U'\left(Y_{01,i}\right)+\gamma U'\left(Y_{01,j}\right)\right]+(1-p_i)(1-p_i)\left[U'\left(Y_{00,i}\right)+\gamma U'\left(Y_{00,j}\right)\right].$$

In case of the non-separability of utility in (C3A) as γ increases, the absolute difference between the terms $\gamma Y_{11,j}$ and $\gamma Y_{00,j}$ becomes larger because $Y_{00} > Y_{11}$. Depending on the absolute difference between Y_{00} and Y_{11} and the level of risk aversion, $U'(.)$ at $Y_{00,i} + \gamma Y_{00,j}$ could decrease, increase, or stay equal relative to $Y_{11,i} + \gamma Y_{11,j}$ with increasing γ. Thus, agent *j's* anticipated self-protection decision and the level of pro-sociality represented by γ may reinforce each other positively, negatively, or not at all for risk-averse individuals.

Considering the separability of utility as in (C3B), we find that with increasing γ, the absolute difference between the terms $\left[U'\left(Y_{11,i}\right)+\gamma U'\left(Y_{11,j}\right)\right]$ and $\left[U'\left(Y_{00,i}\right)+\gamma U'\left(Y_{00,j}\right)\right]$ becomes larger because $U'\left(Y_{11,j}\right) > U'\left(Y_{00,j}\right)$ for $U''(.) < 0$. Thus, agent *j's* anticipated self-protection decision and the level of pro-sociality represented by γ reinforce each other positively for risk-averse individuals.

The relationship between pro-sociality γ and risk aversion is illustrated for the non-separability (Panel A) and the separability (Panel B) of utility based on the parameterization of our experiment in Figure 3.5. Whereas the impact of agent *j's* anticipated self-protection decision is not very large for the non-separability assumption, we observe a substantial increase in the preference for self-protection area when assuming the separability of utility. Thus, whereas preferences for self-protection are driven by pro-sociality γ in the case of non-separability, both pro-sociality γ and *j's* anticipated self-protection decision drive preferences for self-protection.

This is due to a special feature of the separable utility specification. Especially for high risk aversion, the agent cares mostly about the worst possible state of the world. If γ is high, this is the worst state of that peer, who is worse off. Thus, if *j* invests in self-protection, this makes *i* care more about *j*'s risk; consequently, *i* is more inclined to invest in self-protection. If *j* does not invest, this makes *i* care more about the own payoff under the worst state of the world, which can be improved by not investing in self-protection. The phenomenon in which *i*'s utility might depend so little on the own payoff whenever *j* is somewhat worse off strikes us as a restrictive assumption. This is less of a problem under non-separability because the agent essentially cares about a weighted average payoff across different states of the world. This is also a restrictive

feature, but less so in our case, where payoffs of *i* and *j* are highly correlated and can only differ due to differential self-protection decisions. We therefore prefer to show simulation results under non-separability.

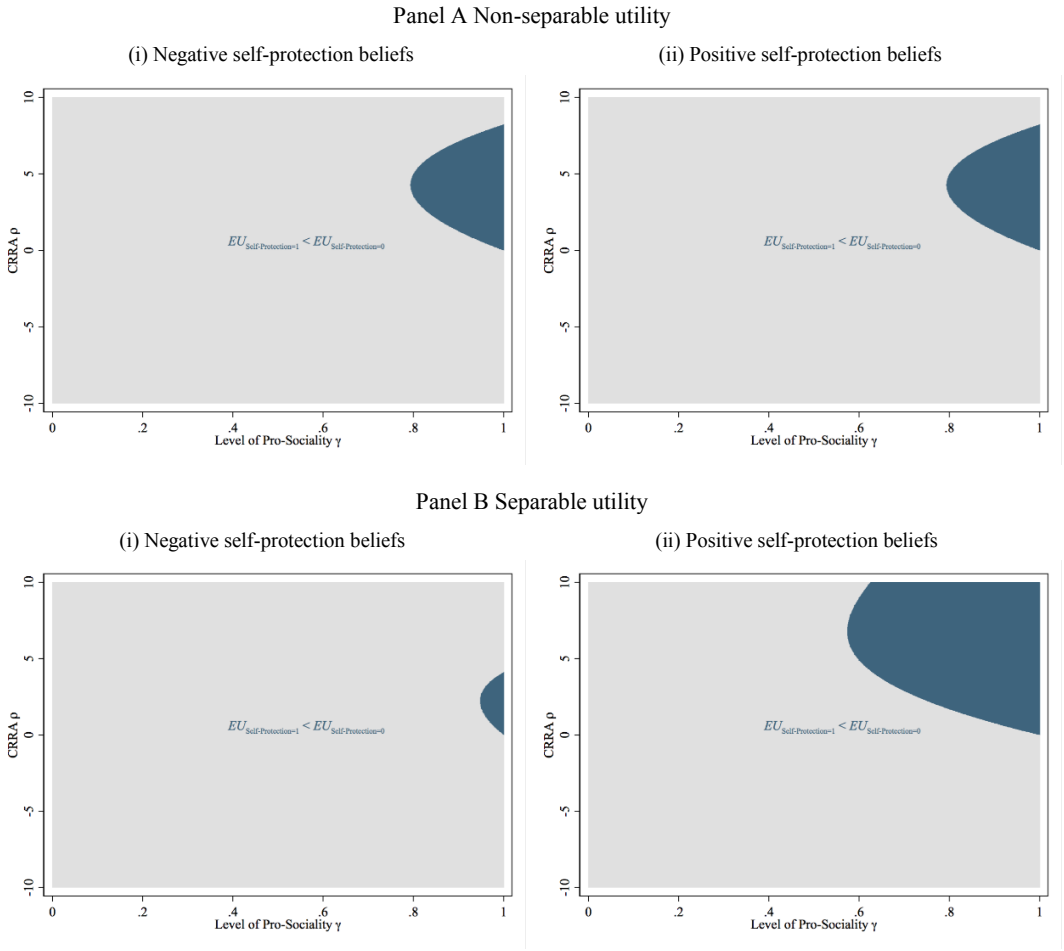

Figure 3.5: Preference for self-protection as a function of risk aversion and pro-sociality

Notes: The preference for self-protection is expressed in terms of the EU with self-protection relative to EU without self-protection. Areas with values larger than one (i.e., preference for self-protection) are colored blue and areas with values smaller than one (i.e., preference for no self-protection) are colored grey. EU depends on the anticipated self-protection of group peers; thus, the separation into those individuals expecting their group peer to invest in self-protection (G_{pos}) and those that do not expect such behavior (G_{neg}). Panels A and B utilize the preference concept as represented by $U_i\left(Y_{z,i}, Y_{z,j}, \gamma\right) = U_i\left(Y_{z,i} + \gamma \cdot Y_{z,j}\right)$, whereas Panels C and D utilize the preference concept as represented by $U_i\left(Y_{z,i}, Y_{z,j}, \gamma\right) = U_i\left(Y_{z,i}\right) + \gamma \cdot U_i\left(Y_{z,j}\right)$.

Appendix D

Estimation of the risk-aversion parameter distribution

From our theoretical considerations, we know that self-protection should depend on risk aversion. To predict the proportions of the population that will adopt self-protection, we therefore need to know the distribution of risk aversion in the population. The Binswanger (1980) lottery included in our games only allows for a classification of individuals within a certain range of risk aversion. Those ranges do not necessarily coincide with the intervals for which we predict a specific behavior. We must therefore estimate the proportion within those intervals of interest by fitting a parametric distribution to the data. Because our lottery data are skewed to the right, we estimate a generalized gamma distribution, which is more flexible than the other skewed distributions available (e.g., Weibull or Gamma). In addition to the three parameters of this distribution, we estimate a shift parameter that allows the risk-aversion parameters to be negative. The estimated density functions (see Figure 3.6) predict similar proportions of the sample population in the risk-aversion parameter ranges as observed in the data (see Table 3.7).

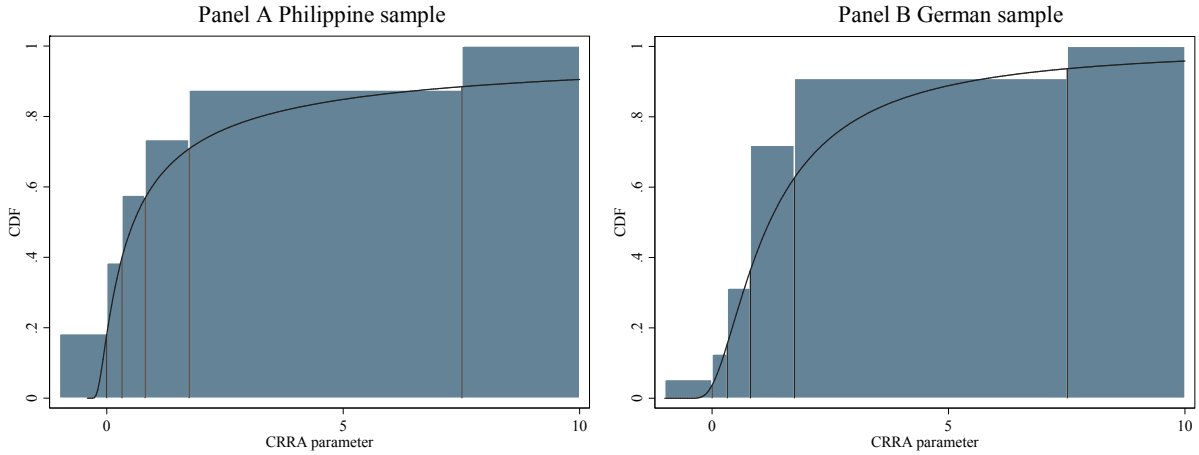

Figure 3.6: Estimated CDFs and points of interest (see interval boundaries in Table 3.6)

Table 3.7: Binswanger (1980) lottery results and estimated distribution of risk aversion

	Lottery characteristics			**Parameter range of risk aversion ρ[a]**		**Generalized Gamma CDF fit (Philippines)**		**Generalized Gamma CDF fit (Germany)**	
Choice	High payoff (PHP/EUR)	Low payoff (PHP/EUR)	Expected value	Lower bound	Upper bound	Actual share	Predicted share	Actual share	Predicted share
1 (safe)	100	100	100	7.51	inf	0.13	0.12	0.09	0.06
2	190	90	140	1.74	7.51	0.14	0.18	0.19	0.31
3	240	80	160	0.81	1.74	0.16	0.14	0.41	0.26
4	300	60	180	0.32	0.81	0.19	0.17	0.19	0.21
5	380	20	200	0	0.32	0.20	0.22	0.07	0.11
6 (risky)	400	0	200	- inf	0	0.18	0.18	0.05	0.04

Note: [a] Based on CRRA EU as described in Section 3.2.5.

Appendix E

Typhoon summary statistics

Table 3.8: Typhoon summary statistics

Variable	Treatment					
	C	**I_{low}**	**I_{high}**	**$G_{private}$**	**G_{public}**	**Equality of means (p-value)**[d]
			Mean [a] *(SD)*			
Panel A: Typhoon sample split						
After typhoon[b]	0.41 (0.50)	0.46 (0.51)	0.41 (0.50)	0.56 (0.50)	0.41 (0.50)	
Panel B: Degree of typhoon exposure (only after typhoon sample)						
Degree of typhoon shock[c]	3.25 (1.46)	2.59 (1.05)	3.19 (1.56)	3.07 (0.98)	4.10 (1.71)	0.17
Household members hurt during typhoon[b]	0.04 (0.09)	0.00 (0.00)	0.04 (0.09)	0.03 (0.06)	0.03 (0.05)	0.57
House damaged[b]	0.53 (0.43)	0.44 (0.33)	0.46 (0.40)	0.36 (0.31)	0.61 (0.41)	0.49
Degree of damage to house[c]	2.76 (1.61)	2.15 (1.07)	2.42 (1.72)	1.99 (1.00)	3.12 (1.50)	0.24
Equality of means (p-value)[d]		0.45	0.94	0.24	0.44	0.28

Notes: [a] Asterisks indicate the significance levels of differences in means relative to the control group *C* based on clustered session-level standard errors, which are reported in parentheses. [b] Indicator variable where 1 is "yes" and 0 is "no." [c] Scores are based on a seven-point Likert scale question, where 7.00 indicates strongly affected/totally destroyed. [d] We report p-values for multivariate equality in means tests based on Wilks's lambda test statistics.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix F
Probit estimation

Table 3.9: Probit estimation of treatment effects

	Philippine sample		German sample		Philippine sample		German sample	
Independent variables	(1) Probit	(2) Probit	(3) Probit	(4) Probit	(5) Probit	(6) Probit	(7) Probit	(8) Probit
Panel A: Average treatment effects								
I_{low}	-0.0288	-0.0283	-0.204***	-0.211***	-0.0261	-0.0275	-0.185***	-0.193***
	(0.0383)	(0.0364)	(0.0453)	(0.045)	(0.0347)	(0.033)	(0.0411)	(0.0409)
I_{high}	-0.107**	-0.105**	-0.478***	-0.477***	-0.0967**	-0.0944**	-0.435***	-0.433***
	(0.0477)	(0.046)	(0.0406)	(0.0405)	(0.0432)	(0.0416)	(0.0368)	(0.0367)
$G_{private}$					0.179***	0.166***	0.00445	0.00259
					(0.0359)	(0.0353)	(0.0522)	(0.052)
G_{public}					-0.341***	-0.346***	-0.409***	-0.420***
					(0.0504)	(0.0484)	(0.0455)	(0.0456)
$G_{private\ pos}$					0.225***	0.222***	0.0788	0.0774
					(0.0464)	(0.0441)	(0.054)	(0.0535)
$G_{private\ neg}$					-0.190***	-0.188***	-0.489***	-0.484***
					(0.0669)	(0.0655)	(0.0514)	(0.0508)
$G_{public\ pos}$	0.0379	0.0251	-0.212***	-0.217***				
	(0.0401)	(0.0398)	(0.0453)	(0.0445)				
$G_{public\ neg}$	0.139***	0.136***	-0.180***	-0.181***				
	(0.0491)	(0.0464)	(0.0481)	(0.0479)				
Panel B: Control variables								
Sociodemographic	No	Yes	No	Yes	No	Yes	No	Yes
Risk and ambiguity	No	Yes	No	Yes	No	Yes	No	Yes
Mental capabilities	No	Yes	No	Yes	No	Yes	No	Yes
Game rounds	No	Yes	No	Yes	No	Yes	No	Yes
Typhoon	No	Yes	No	No	No	Yes	No	No
Panel C: Model								
Observations[a]	2,976	2,973	2,076	2,076	2,976	2,973	2,076	2,076
logLik	-1,773	-1,751	-1,326	-1,315	-1,614	-1,596	-1,215	-1,203
Pseudo R^2	0.0233	0.0347	0.0766	0.0841	0.111	0.12	0.154	0.163

Notes: The probit models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. The results are provided in terms of marginal effects. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the session level for the Philippine sample and at the individual level for the German sample and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Individual sociodemographic control variables include the following: sex, age, whether the subject is responsible for household financial decision-making, and annual income. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix G

Subsample results

Table 3.10: Linear probability models for self-protection

	Mannheim sample		Magdeburg sample		Mannheim sample		Magdeburg sample	
Independent variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS
Panel A: Average treatment effects								
I_{low}	-0.369***	-0.370***	-0.142***	-0.151***	-0.369***	-0.375***	-0.142***	-0.150***
	(0.0839)	(0.0817)	(0.0543)	(0.0538)	(0.0841)	(0.0817)	(0.0544)	(0.0538)
I_{high}	-0.554***	-0.547***	-0.462***	-0.460***	-0.554***	-0.549***	-0.462***	-0.459***
	(0.077)	(0.0797)	(0.0508)	(0.0513)	(0.0772)	(0.0798)	(0.0509)	(0.0512)
$G_{private}$	-0.272***	-0.270***	-0.192***	-0.197***				
	(0.084)	(0.0853)	(0.0554)	(0.056)				
G_{public}	-0.403**	-0.33	-0.150***	-0.152***				
	(0.192)	(0.212)	(0.0528)	(0.053)				
$G_{private\ pos}$					-0.102	-0.0936	0.0492	0.0497
					(0.0971)	(0.101)	(0.0586)	(0.0588)
$G_{private\ neg}$					-0.501***	-0.508***	-0.446***	-0.458***
					(0.0989)	(0.0949)	(0.0579)	(0.0589)
$G_{public\ pos}$					0.0655	0.179	0.0873*	0.0864*
					(0.155)	(0.174)	(0.051)	(0.0502)
$G_{public\ neg}$					-0.701***	-0.653***	-0.507***	-0.504***
					(0.108)	(0.119)	(0.0551)	(0.0546)
Intercept	0.792***	0.512**	0.724***	0.749***	0.792***	0.571**	0.724***	0.839***
	(0.0531)	(0.231)	(0.0347)	(0.197)	(0.0532)	(0.221)	(0.0347)	(0.178)
Panel B: Control variables								
Sociodemographic	No	Yes	No	Yes	No	Yes	No	Yes
Risk and ambiguity	No	Yes	No	Yes	No	Yes	No	Yes
Mental capabilities	No	Yes	No	Yes	No	Yes	No	Yes
Game rounds	No	Yes	No	Yes	No	Yes	No	Yes
Panel C: Model								
Observations[a]	516	516	1,560	1,560	516	516	1,560	1,560
R^2	0.153	0.182	0.091	0.102	0.212	0.246	0.207	0.219
R^2 adj.	0.147	0.161	0.0888	0.0947	0.202	0.223	0.204	0.211

Notes: The linear probability OLS models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the individual level and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Individual sociodemographic control variables include the following: sex, age, whether the subject is responsible for household financial decision-making, and annual income. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix H

Main results including coefficients for all control variables

Table 3.11: Linear probability models for self-protection

	Philippine sample		German sample	
Independent variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Panel A: Average treatment effects				
I_{low}	-0.0297	-0.0311	-0.212***	-0.213***
	(0.0386)	(0.0388)	(0.0455)	(0.0458)
I_{high}	-0.115**	-0.115**	-0.485***	-0.485***
	(0.0516)	(0.0517)	(0.0424)	(0.0425)
$G_{private}$	0.0256		-0.219***	
	(0.0403)		(0.0465)	
G_{public}	0.124***		-0.181***	
	(0.0409)		(0.0487)	
$G_{private\ pos}$		0.156***		0.00306
		(0.034)		(0.0506)
$G_{private\ neg}$		-0.426***		-0.472***
		(0.0569)		(0.0499)
$G_{public\ pos}$		0.196***		0.0682
		(0.0358)		(0.0463)
$G_{public\ neg}$		-0.236***		-0.533***
		(0.0842)		(0.0495)
Intercept	0.370***	0.461***	0.610***	0.691***
	(0.134)	(0.123)	(0.149)	(0.138)
Panel B: Control variables				
Sex	0.0512	0.0464	0.0151	0.0334
(1=female)	(0.0363)	(0.0327)	(0.0437)	(0.0413)
Age	0.00306**	0.00255**	-0.00393	-0.00575
(in years)	(0.00125)	(0.00115)	(0.00434)	(0.00418)
Financial	0.101	0.0785	0.0444	0.0396
responsibility	(0.0815)	(0.0676)	(0.0332)	(0.0306)
Household annual income	0.00000309	-0.0000240	0.00386	0.0135
(in 1,000 PHP or EUR)	(0.0000566)	(0.0000498)	(0.0578)	(0.0555)
Numeracy	-0.000135	-0.00303	0.0101	0.0104
performance	(0.00523)	(0.00494)	(0.0101)	(0.00928)
Ambiguity	-0.000374	-0.000701	0.0330*	0.0244
aversion	(0.0133)	(0.0121)	(0.0175)	(0.0158)
Risk	0.00912	0.00528	-0.0146	-0.0159
aversion	(0.00768)	(0.00704)	(0.0134)	(0.0124)
Game	0.00101	-0.00511	0.0143	0.0163
round 5	(0.0126)	(0.0128)	(0.0168)	(0.0164)
Game	0.0182	0.015	0.0213	0.0271
round 6	(0.0114)	(0.0114)	(0.0168)	(0.0166)
Typhoon	0.0657**	0.0596**		
	(0.0289)	(0.025)		
Panel C: Model				
Observations[a]	2,973	2,973	2,076	2,076
R^2	0.042	0.143	0.111	0.213
R^2 adj.	0.037	0.139	0.106	0.207

Notes: The linear probability OLS models are used with the dependent variable set to 1 if the subject chooses to invest in self-protection. For the treatment variables, the control group *C* serves as the reference category; regression estimates for treatments thus measure the average difference between the respective treatment and the control group *C*. Standard errors are corrected for clustering at the session level for the Philippine sample and at the individual level for the German sample and reported in parentheses. This also controls for a possible correlation of self-protection decisions across rounds. Risk and ambiguity controls include a risk-aversion measure resulting from Binswanger (1980) lottery choices and a questionnaire item score for ambiguity aversion. The control variable for mental capability is the number of correct answers to numeracy tasks.[a] In the German sample, 24 observations (i.e., one round for 24 subjects) evenly distributed between treatments were lost due to a technical problem in the laboratory.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Chapter 4

Risk Preferences and Microinsurance Demand in the Midst of Shocks

with Christian Biener*

Abstract

Exploiting exogenous variation in exposure to Typhoon Haiyan, we provide evidence on the impact of a large-scale shock on risk preferences and insurance demand. We conduct lab-in-the-field experiments with rural villagers in the Philippines comprising lottery choices under risk and an insurance game before and after the typhoon. We find that individuals are more risk-loving after the typhoon. The analysis also reveals a treatment effect of the natural disaster on insurance take-up that differs for two types of insurance—individual and group insurance. In particular, take-up for individual insurance increases and take-up for group insurance decreases following the typhoon. The results for the risk-loving behavior and the demand for individual insurance can be reconciled using the theory of salience. The decrease in demand for group insurance can be rationalized in that mutual sharing of losses under group insurance appears less attractive following the realization of a large cumulative shock.

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4.1 Introduction

Globally we are seeing an increase in the incidence of natural disasters (World Bank, 2014). More than one million people have lost their lives and 2.3 billion others have been directly affected by natural disasters around the world since the early 2000s (Guha-Sapir and Santos, 2013). In 2013 alone, 330 natural disasters were registered, killing more than 20,000 people and significantly affecting 96.5 million people worldwide (CRED, 2014). While developing countries are not necessarily more prone to natural disaster events, a disproportionate share of the deaths caused by such environmental shocks is borne by societies in the developing world (Kahn, 2005). Moreover, the poorest segment of the population is particularly vulnerable to risks that reduce incomes and increase expenditures (Skees et al., 2002). Theoretically it is not clear whether experiencing a disaster leads to an increase or a decrease in risk aversion or insurance demand, and empirical evidence is scarce and ambiguous (for risk preferences, see Li et al., 2011; Page et al., 2012; Gloede et al., 2012; Reynaud and Aubert, 2014; Cameron and Shah, 2015; for insurance demand, see Michel-Kerjan and Kousky, 2010; Aseervatham et al., 2013; Turner et al., 2014).

This paper presents evidence on the impact of the 2013 Typhoon Haiyan – one of the strongest tropical cyclones ever to strike land – on low-income individuals in the rural Philippines. We examine the impact of this large-scale disaster on risk preferences and insurance demand for two types of insurance schemes, namely individual and group insurance. Group insurance differs from individual insurance in that peers are jointly insured and share the risk inherent in a contractually agreed deductible.[1] While risk sharing within a community as operationalized under the group insurance scheme can be effective for independent risks, such strategies are less effective for covariate risks where many individuals within the same community face losses simultaneously (Skees et al., 2002).

We find that the typhoon significantly increases risk-loving behavior in the aftermath of the typhoon. The results are in line with several studies that consider the impact of a large-scale shock on risk preferences immediately afterwards. Eckel et al. (2009) explain the risk-loving choices of individuals post-Hurricane Katrina by the effect of the traumatic experience on the subjects' psychological state. Li et al. (2011) investigate the effects of heavy snow-hit and a major earthquake in China and find that people are not always more risk averse after a disaster. Page et al. (2012) find that victims of the 2011 Australian floods (Brisbane) are more likely to opt for a risky

[1] This group insurance scheme has been developed and tested with regard to its impact on self-protection in Biener et al. (2015). We use two additional treatments from their experimental setup where insurance take-up is voluntary as opposed to mandatory take-up.

gamble, which they explain as being consistent with Prospect Theory predictions of adopting risk-loving attitude after facing a large loss.

We also investigate the impact of the natural disaster on insurance demand based on incentivized experiments. We find that the typhoon increases take-up of individual insurance by 12.7 percentage points. This result is in line with previous literature. Consistent with "availability bias", people are more likely to purchase insurance immediately after a loss (Johnson et al., 1993; Kunreuther, 1996; Browne and Hoyt, 2000; Kunreuther and Pauly, 2005). In an experimental study similar to ours, Turner et al., (2014) find that flood-affected individuals demand significantly more experiment 'insurance' compared to non-flood affected individuals. However, the typhoon decreases take-up of group insurance by 12.4 percentage points. The results can be rationalized in that mutual sharing of losses under group insurance appears less attractive following the realization of a large cumulative shock. To the best of our knowledge, we are the first to study the impact of a natural disaster on take-up of group insurance in a low-income context.

The theory of salience by Bordalo et al. (2012) can help explain how individuals exhibit risk-loving behavior and yet buy insurance. According to Taylor and Thompson (1982), salience is a phenomenon when something stands out and receives disproportionate attention in an individuals' decision-making. Bordalo et al. (2012) note that the decision maker is risk-seeking when a lottery's upside is salient and risk-averse when its downside is salient. In our experiment, the possibility of winning a greater amount in the lottery to elicit risk preferences, i.e., the upside is more salient such that individuals are more risk-seeking. In case of the insurance choice, the possibility of losing a large amount, i.e., the downside is more salient such that individuals are more risk-averse and choose to buy insurance. It is likely that the typhoon increases the salience of gains and losses after individuals have experienced such a traumatic event involving real-life losses. For example, Elgin (2007) notes that emotions are sources of salience, and that they might make individuals notice elements they would otherwise miss.

We make two distinct contributions to the economics literature on natural disasters pertaining to risk preferences and insurance demand. Our first contribution to the literature is to examine the impact of the natural disaster immediately afterwards, with a gap of only a few days to a few weeks. The time lapse between the natural disaster and measurement of risk preferences seems to be a crucial element. Prior research can be categorized into those that look at immediate impact and those that look at impact a few years later. Studies that look at immediate impact, such as that by Eckel et al.

(2009), Page et al. (2012), and Li et al. (2011) where risk preferences are measured a few weeks to a few months after the disaster experience, find individuals exhibiting a risk-loving behavior. In contrast, studies that look at impact a few years later, as in Cassar et al. (2011), Gloede et al. (2012), Reynaud and Aubert (2014), and Cameron and Shah (2015), find individuals displaying more risk-aversion after the disaster experience. Ingwersen (2014) examines both short-term (a year after the disaster) and long-term (five years after the disaster) impact of the Indian Ocean tsunami and find that in the short-term, there is a temporary increase of risk-loving behavior. Hence, risk preferences seem to evolve over time. This is an important area of study given that risk-taking behavior has implications for many household decisions related to savings (Rosenzweig and Stark, 1989), remittances (Yang, 2008), human capital (Baez et al., 2010), migration decisions (Paxson and Rouse, 2008), technology adoption (Liu, 2013), and fertility (Schultz, 1997; Finlay, 2009), among others. However, empirical evidence on the relationship between risk preferences and natural disaster remains inconclusive and a greater understanding of how this relationship might change over time could help us understand different household decisions.

Our second contribution is to the study of natural disasters and insurance demand in a low-income context. We consider group insurance schemes in our setting, which has received limited attention in the microinsurance sphere. Microinsurance research to date has focused on insurance purchase as an individual decision; however, group schemes have the potential to increase demand for microinsurance (Cole et al., 2012; Janssens and Kramer, 2012). Our companion paper also shows that group insurance has the potential to mitigate ex-ante moral hazard (Biener et al., 2015). This paper study attempts to fill this gap in the literature by looking at demand for both individual and group insurance in the context of a large-scale shock.

Moreover, it is difficult to establish credibly that those who live in disaster-affected areas are not different from those in areas that are not affected by the disaster, for e.g., in terms of wealth, risk aversion, and social network, among others. It is possible that wealthier individuals choose to live in areas that are more protected from natural disasters, introducing a correlation between risk aversion and natural disasters that is not causal (Cameron and Shah, 2015). Similarly, less risk-averse individuals or those with stronger social networks might choose to live in more disaster-prone areas. Moreover, these same factors such as wealth, risk aversion, and social network are likely to be affected by natural disasters. Most of the studies mentioned earlier have limitations in their identification strategies either because they are not able to control for exposure to the shock related to selection bias or because the sample is not

representative of the population exposed to the shock as they are post-disaster studies.[2] We provide several key evidence including detailed measures on wealth, shock experiences, prior experience with insurance, and social network in both pre- and post-typhoon scenario to support our identification strategy.

The paper proceeds as follows: in Section 4.2, we provide further discussion on the link between natural disasters, risk preferences, and insurance demand. Section 4.3 contains information on the typhoon and the country setting. Data and experimental design is described in Section 4.4 and the empirical strategy in Section 4.5. Results are presented in Section 4.6 and we conclude in Section 4.7

4.2 Natural disasters, risk preferences, and insurance demand

Recent literature on the economics of natural disasters reveals that besides economic losses, such shocks may have long-lasting impact on individuals' behavior through their effect on risk preferences. Theoretically, it is not clear whether a disaster experience leads to an increase or decrease in an individuals' risky behavior (Cameron and Shah, 2015). One way in which risk preferences might change with natural disasters is through the addition of "background risks", or risks that are beyond the control of the individual and unrelated to the risk in the decisions being considered (Eeckhoudt et al., 1992). A natural disaster may constitute a shock that contains new information, causing an update in estimates of background risk (Reynaud and Aubert, 2014; Cameron and Shah, 2015). As Cameron and Shah (2015) note, it seems implausible to think of disaster victims as not being shocked by the event and reevaluating their surrounding. Someone who has just lived through a natural disaster such as a typhoon then might perceive the world as a riskier place than before the disaster, which might affect his or her risk-taking behavior. However, it is not clear whether there is more or less risk-taking with the addition of background risk. Using Expected Utility Theory (EUT), Gollier and Pratt (1996) show that individuals are risk-vulnerable and in the presence of background risk, they display risk aversion with respect to any foreground risk. In contrast, Quiggin (2003), using non-EUT based on probability weighting, shows that the addition of background risk might lead an individual to select riskier choices.

Another way in which risk preferences could change with natural disasters is through changes in preferences where a shock might induce individuals to react emotionally rather than cognitively, leading to more risk-loving behavior (Loewenstein et al., 2001; Reynaud and Aubert, 2014; Cameron and Shah, 2015). The experience of a disaster

[2] Ingwersen (2014) provides a description of the shortcomings of most of these studies.

might in fact lead individuals to put a higher weight on emotions (Eckel et al., 2009).

A more direct way in which risk preferences might change with natural disasters is through the changes in wealth and income (Ingwersen, 2014; Cameron and Shah, 2015). Disasters have a negative impact on assets and income, which might lead to a change in risk-taking behavior. Our data allows controlling for changes in income and assets, and exploring whether it is the addition of background risk or assigning higher weight on emotions that drives any observed changes in risk preferences.

If natural disasters alter individuals' risk preferences, this might lead to a change in demand for mitigation and insurance (Browne and Hoyt, 2000; Fier and Carson, 2010; Turner et al., 2014). The link between risk preferences and insurance demand has been studied since the 1960s starting with the work of Yaari (1964). In fact, the core of any theory of insurance demand is risk aversion[3] (Schlesinger, 1997; Outreville, 2014). It is hypothesized that risk aversion is positively correlated with insurance demand (Schlesinger, 1981; Outreville, 2014). Empirically, the evidence on the relationship between risk aversion and insurance demand is inconclusive for developed insurance markets (Outreville, 2013; Zietz, 2003). In contrast, in the context of developing countries, studies almost universally show a negative association between risk aversion and insurance demand i.e., more risk-averse households are less likely to buy insurance (Giné et al., 2008; Giesbert et al. 2011; Kouame and Komenan, 2012; Cole et al., 2013). Such a relationship has been explained by suggesting that households view insurance as risky (Giné et al., 2008) or have a limited understanding of the product (Cole et al., 2013). Factors such as price uncertainty associated with crop insurance (Kouame and Komenan, 2012) and the possibility of non-performance in case of rainfall insurance in the presence of basis risk (Clarke, 2011b) may cause individuals to view insurance as risky.

At the same time, attitudes towards risk are unstable, and people can exhibit both risk-loving and risk-averse behavior in both experiments and everyday life (Friedman and Savage, 1948; Bordalo et al., 2012). The salience theory of choice under risk, proposed by Bordalo et al. (2012), accounts for such paradoxical phenomena as people displaying risk-loving behavior in gambles and yet buying insurance at the same time. Hence, the relationship between natural disasters, risk preferences, and insurance demand is likely to vary depending on the situation and over time.

[3] The demand for insurance is a function of wealth, expected income, expected rate of returns on alternative investments, and subjective discounting functions for assessing those investments, with the level of risk aversion having an impact on the discount factors (Outreville, 2014).

4.3 The Philippines and Typhoon Haiyan

The Republic of the Philippines is a lower-middle-income country with a population of 94.9 million (Chakraborty, 2013). It is one of the top five countries over the last decade to be most frequently hit by natural disasters. According to the World Risk Index, the Philippines ranks third globally in two categories – highest risk and most exposed – to disasters resulting from extreme natural events (ADW, 2013). With 60 percent of its population living in coastal areas and lying in the typhoon belt, it is one of the countries with the highest exposure to climate change risks (Safir et al., 2013). Change in climate due to global warming is forecasted to increase average annual precipitation for the Philippines, leading to wetter wet seasons and dryer dry seasons (Safir et al., 2013).

The Philippines lies in the typhoon belt and suffers an annual onslaught of dangerous tropical cyclones from July through December, averaging around 19 to 20 tropical cyclones annually (UNISDR, 2013).[4] It is also affected by other severe weather systems such as the monsoons that trigger floods and rain-induced landslides. The country is situated in the Pacific Ring of Fire where two major plates (Philippine Sea and Eurasian) meet, which explains the occurrence of earthquake and tsunamis as well as the existence of around 300 volcanoes of which 22 are classified as active. It is estimated that 0.5 percent of GDP is lost to natural disasters each year; this figure is expected to increase to 1 or 2 percent due to climate change.

On 8th November 2013, Typhoon Haiyan, one of the strongest tropical cyclones ever to strike land, made landfall in the central Philippines (CRED, 2014).[5] The typhoon affected 16.1 million people and resulted in more than 7,000 deaths in the Philippines, making it also the deadliest disaster in 2013. Over 4.1 million people were displaced by the typhoon and over 1.1 million houses were damaged or destroyed. Costs from Typhoon Haiyan in the Philippines were estimated at US$ 10 billion.

A total of 171 municipalities in 14 provinces and six regions located within the 50-KM storm track were identified as priority areas for assistance given the scale and severity of the destruction caused by the typhoon. Our study site, Iloilo province in the Western Visayas, was one of the provinces included in the priority areas. The province was placed under a state of national calamity on 11th November 2013. Many houses along the path of the typhoon were completely destroyed in addition to over 70,000 partially damaged structures (72,493 destroyed and 73,142 partially damaged) (NDRRMC, 2013).

[4] Information in this paragraph is gathered from UNISDR (2013) unless noted otherwise.
[5] Information in this paragraph is gathered from CRED (2014) unless noted otherwise.

4.4 Data and experimental design

The data for our empirical analysis comes from our experiments involving insurance games in the Philippines. Our sample consists of 352 rural villagers spread across 40 villages in the Iloilo and Guimaras province. We conducted experiments in October and November 2013. Typhoon Haiyan struck our research site in the middle of our experimental phase, splitting the sample into almost equal pre- and post-typhoon groups, allowing for identification of its impacts.

4.4.1 Experimental design

Measuring risk preferences

We implemented experimentally elicited risk preferences using the Ordered Lottery Selection design of Binswanger (1980). The Ordered Lottery Selection is particularly suitable for nonstandard samples with low levels of education compared to alternative methodologies that have become more popular in experiments with standard samples (Clarke and Kalani, 2012; Barr and Genicot, 2008). In the lottery, each participant is asked to choose between six lotteries (see Figure 4.2, Appendix A) that vary in risk and expected return, as shown in Table 4.10 (see Appendix A). Lottery 1 is the safe option, offering a sure amount, and lottery 6 is the risky option with the highest payoff mean and variance. The gamble was framed in the gain domain in line with much of the experimental economics literature (Barr and Genicot, 2008; Clarke and Kalani, 2012; Kouame and Komenan, 2012; Cameron and Shah, 2015). The lottery was conducted before the start of the game; hence, individuals' lottery choices are unaffected by the experiences and outcomes within the game. To utilize the measure of risk preferences, we use the lottery choices 1 to 6 as the risk measure. Binswanger (1980) computed point estimates of partial risk aversion coefficients, S, and used the logarithm of S as the measure of risk aversion. However, one can also choose to simply use the numbers 1 to 6 as the variable, as there is little impact of using either lnS or the choices 1 to 6 as the variable on regression results (Binswanger, 1982; Kouame and Komenan, 2012). Hence, we simply use the lottery choices 1 to 6 as the risk measure.

Individual and group insurance setups

Our experimental setup included two treatments, which we will refer to as 'setups' so as not to confuse with the main treatment, 'typhoon'. Subjects were assigned either to individual insurance or group insurance. The main difference in the group insurance setup was that this type of insurance covered groups of two and there was mutual loss sharing among the group members.

At the start of the experiment, all participants receive an initial endowment of 300 Philippine pesos[6] (PHP). The initial probability of loss is 40 percent. This is simulated with a bag containing ten balls, four of which are orange and six are white. Drawing an orange ball leads to a loss of PHP 200. Self-protection is introduced in the form of a payment of PHP 20, for which participants can choose from another bag containing two orange balls such that the loss probability is 20 percent. For the insurance, the premium is set at PHP 50 and the deductible at PHP 100. We chose the values such that the premiums are related to the expected value of claims and further to reflect loading, we add a 25 percent markup. Additionally, the cost of PHP 20 for self-protection was chosen so that it would be economically beneficial to invest in self-protection while having no insurance even for risk-neutral and some risk-loving subjects. For experimental values and payouts, see Table 4.1.

The experimental procedure for one session round is as follows. First, the instructor explained the games to all participants jointly and each participant received an initial endowment for the first round. After the introduction, participants were tested individually on a set of game-related questions to determine their understanding. Only participants who answered all questions correctly were allowed to continue. The game started with an insurance decision, where participants had to indicate whether they would buy insurance or not for a fixed premium. The next step involved making decision about self-protection, represented by the choice of two bags, one with four orange balls and one with two orange balls. Once the self-protection decision was made, participants drew from the bag of their choice. If they drew an orange ball, they had a loss, which was covered partially by insurance. In case of group insurance, if the group had chosen insurance and in case only one of the players drew a loss, the other half of the loss not covered by the insurance was shared between the two peers. Results were then recorded and another round of the game is played until three rounds are complete.

In the case of group insurance, both peers had to agree or disagree whether or not to have insurance. In case one chose to have insurance and the other did not, a coin toss determined whether they would have the group insurance or not. As there was mutual loss sharing, the final outcome for both was determined only after both had made self-protection choice and had drawn losses from their respective choice of bags.

Both games incorporated six rounds, with the first three rounds including only self-protection decisions to familiarize participants with game procedures. The initial

[6] 100 PHP is equivalent to 2.3 USD as of 20, April 2015, according to XE Currency Converter. The average daily basic pay of wage and salary workers in Western Visayas was PHP 271.31 in 2013, according to the Bureau of Labor and Employment Statistics, Philippines (BLES, 2013).

endowment was restored before every round to prevent wealth effects. We used play money throughout the experiment to represent the amounts at stake. Before the experiment started, the participants were informed that their decisions in the games would influence their final payout but that only one of the game rounds—to be determined randomly—would be paid out in real money.[7]

Survey

In addition to the experiment, we conducted pre- and post-experimental survey where we gathered information on socio-demographic characteristics such as age, gender, marital status, income, along with math abilities, shock history, and experience with insurance.

4.4.2 Sampling frame and randomization

We implemented a two-stage randomization procedure where in the first stage we randomly sampled villages and in the second stage, randomly selected participants from within the villages. We excluded those villages that were urban and located in relatively rich municipalities, thus excluding municipalities with income classes 1 and 2.[8] Because of the logistics of traveling, our final sample consists of barangays in both the pre- and post-typhoon period that are within a 50-KM radius of Iloilo City, the capital of Iloilo province. Figure 4.1 provides an overview of the geographic allocation of the villages of the Iloilo and Guimaras provinces in which we conducted the experiments.

We had access to the complete list of households in the villages and received permission from the elected village representative to conduct the experiment and select the residents randomly to participate. Although we sent game invitations to household heads, their spouses could also participate. We further required participants to be between 18 and 70 years of age. Our final sample size is 352 participants in the two setups.

To test for balance across the two groups, Columns 2 and 3 of Table 4.11 (see Appendix B) present the means in the individual insurance and group insurance groups, respectively. Column 4 presents the p-value for a t-test of the equality of means across the two groups. Only household size is significantly different between

[7] Participants were granted PHP 50 as a participation payment if they were not able or willing to complete the entire procedure. We made it very clear that everyone could discontinue the experiment at any time; however, there were no dropouts.

[8] Income classes are defined by the Department of Finance (Republic of the Philippines, 2008).

the two groups. The groups appear well-balanced overall, as expected due to the randomized assignment to experimental setups.

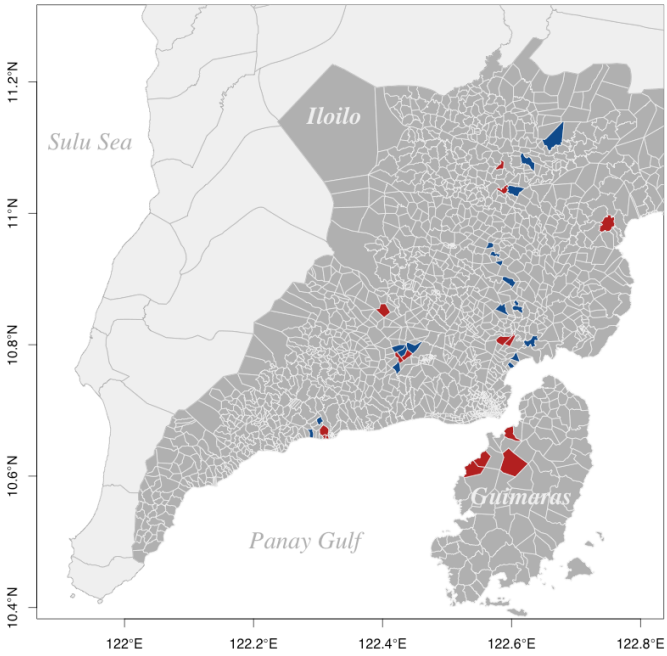

Figure 4.1: Geographic dispersion of experimental villages

Note: The blue areas represent the villages in which we conducted the experiments pre-typhoon and the red areas are post-typhoon.

4.4.3 Sample characteristics

Table 4.2, column 1, presents the sample mean for a series of characteristics used as explanatory variables to test which factors affect risk preferences and insurance take-up decisions in the experiment. A majority of the participants are female (78 percent) and married (79 percent). Although only a third of the participants are household heads (31 percent), a vast majority is responsible for making financial decisions in their households. The average household size is 4. Those younger than 18 and older than 65 were not allowed to participate, and thus, the average age was slightly below 40. Educational level was comparable to the Philippine average, with the average participant having completed 12 years of schooling. About 40 percent of the participants are employed, and the average annual individual income is approximately PHP 23,000. While only 13 percent own their land, 88 percent said they own their house. In terms of financial literacy, which is measured through a set of math and probability questions, the average participant could answer 6 out of 8 math questions.

When asked if they had experienced any shocks (health, fire, theft, agricultural price changes, and weather) in the past three years, 68 percent of the respondents said they had experienced some form of shock; the average respondent said he or she had experienced more than one shock. Risk aversion, measured through the use of Binswanger lottery, reveals that the average respondent has a risk aversion score of 3.76, which is in line with risk aversion score (3.5) found for a similar sample in the study by Pradhan (2014). A little more than half of the respondents have PhilHealth insurance, the country's social health insurance scheme.

4.4.4 Typhoon Haiyan as an exogenous shock

Typhoon Haiyan hit the Western Visayas on November 8th, 2013, in the middle of our experiment period. We conducted experiments until the day before the typhoon and continued the experiments three days after the typhoon. This natural experiment allows us to look at the impact of the typhoon on take-up of insurance as well as its impact on a number of different characteristics.

The path of storms and hurricanes is exogenous in principle (Baez et al., 2015). However, in reality, some regions might be hit harder than others in a non-random way, owing to geographical conditions (Baez et al., 2015). To establish that Typhoon Haiyan indeed is an exogenous shock, we first show that the pre- and post-typhoon samples are balanced for those traits that are unlikely to be affected by the typhoon. One remaining concern is that the pre- and post-typhoon barangays differ in terms of their likelihood of suffering damages by the typhoon, which might be correlated to other factors that influence attitudes towards risk and insurance take-up. To address this issue, we use data on the proportion of houses damaged at the municipality level and show that the damages in the pre- and post-typhoon areas are not significantly different. Moreover, we provide evidence that the pre- and post-typhoon periods are not different in terms of economic and climatic variables such that the only difference between the pre- and post-typhoon samples is the experience of the typhoon alone.

To test for balance across groups, Columns 2 and 3 of Table 4.2 present the means in the pre- and post-typhoon groups, respectively. Column 4 presents the *p*-value for a *t*-test of the equality of means across the two groups. Here we present those characteristics that would not be affected by the typhoon, including both individual and network characteristics. Summary statistics in Table 4.2 shows that the pre- and post-typhoon samples are not significantly different for a number of different traits, including gender, age, household head status, household size, marital status, education, math ability, and PhilHealth enrollment.

Importantly, we see that the proportion of those experiencing other shocks besides the typhoon as well as the variety of shocks experienced (health, fire, theft, agricultural price changes, and weather) is not significantly different across the two samples. From Table 4.2, the groups appear well-balanced overall, as expected due to the nature of the typhoon.

The typhoon was an exogenous shock that could have affected any part of the country, depending on its trajectory. As all the communities in the sample are within 20 KM of the coastline, they are all considered to be within the coastal zone, which is defined as the land area within 60 KM of adjacent near-shore waters (FAO, 1998). However, to distinguish between those living very close to the coast versus a few kilometers away, we define coastline communities to be those living less than 3 KM from the sea. As we have significantly more communities on the coastline in the post-typhoon sample, we include a control for this in the main regression.

In case of Typhoon Haiyan, the communities that suffered the most were not necessarily those close to the sea, rather those that were closer to the path of the typhoon. As Ingwersen (2014, p.7) notes in the case of the Indian Ocean tsunami, where the impact of the tsunami was "a complex function of the distance to the coast, elevation, slope, water depth, the shape of the coast, and the proximity to rivers and canals", similar would be true for the case of the typhoon as well. Because such detailed information on the topography of the barangays is not available, we look at the damages caused by the typhoon at the municipal level. Data on damages of houses at the barangay level is not available, and as the municipalities differ in population size, we rely on proportion of damaged houses instead. Panel B shows that the proportion of houses damaged at the municipal level in our sample pre-typhoon and post-typhoon are not statistically different.

There is no reason for us to believe in either the existence of any impact other than the typhoon, such as post-flood assistance, or the existence of any differential trends that could have affected our results. We conducted experiments until the day before the typhoon and resumed our experiments within 3 days of the typhoon, before significant relief efforts had reached the region. Much of the emergency relief response was concentrated in Tacloban, the most severely affected area in the Philippines, with relief efforts in the Western Visayas being slow or absent (IRC, 2013). Hence, we believe that post-typhoon assistance could not have affected our results.

Moreover, the months of October and November, when the experiments were conducted in the Iloilo province, are similar in terms of temperature and precipitation.

According to the dataset produced by the Climatic Research Unit at the University of East Anglia, the average monthly temperature in the Philippines from 1990 – 2009 for October is 26.3 degrees Celsius and that for November is 26 degrees Celsius (range is 25.3 degrees Celsius in January to 27.3 degrees Celsius in May); also, the average monthly precipitation for the same period in the Philippines from 1990 – 2009 for October is 273.7 mm and for November is 257.7 mm (range is 93.3 mm in April to 286.6 mm in July) (World Bank, 2015a). Furthermore, the harvest season is from August - September, before the start of the experiment. Hence, considering that the pre- and post-typhoon samples are balanced along a number of traits, including the level of damages felt post-typhoon, and that there are no major differences in the two time periods pre- and post-typhoon, we believe that the typhoon is an exogenous shock.

Table 4.3 shows the difference in pre- and post-typhoon samples for those traits that are likely to be affected by the typhoon. Variables that are likely to change with the typhoon are number of assets as well as income, as the typhoon could have destroyed assets and livelihoods in general. Access to safe drinking water and whether one has skipped meals in the past three months could have also changed with the typhoon. The results show that the post-typhoon sample have significantly less number of assets as well as less access to safe drinking water. According to an external assessment of water and sanitation access post-typhoon in Iloilo, access to tube well utilized for drinking water decreased by 11.8 percent and piped water systems by 13.1 percent (WASH, 2014). Moreover, the two samples do not differ in terms of their income, both at the individual and household level.

In Table 4.3, we do not see any fluctuation in income that might have come about from the typhoon. This is reasonable in our case as income is measured through a series of retrospective questions on how many days/weeks/months they work and on average how much they earn in those periods. In terms of meals skipped, there are no significant differences between the two groups. This finding is in line with previous research which shows that in times of adversity, households are better able to protect their basic needs such as food consumption compared to non-food consumption (Safir et al., 2013; Skoufias and Quisumbing, 2005).

Table 4.3 also includes information on social networks. Network size is measured by the number of relatives and friends within and outside of barangay, number of neighbors, and number of barangay officials the participants. The typhoon could also potentially change the perception of people in terms of whether they can rely on their network for emergency relief as well as whether they can receive financial support

from their network. As Castillo and Carter (2011) find, subjects in Honduran communities that experienced larger weather shocks were more likely to have a larger number of friends and emergency contacts. We, however, do not see any difference in social networks pre- and post-typhoon.

4.5 Empirical strategy

Our empirical strategy is simple. We regress risk preferences on the indicator variable for whether someone is exposed to the natural disaster. The identification strategy is based on the following regression:

$$(1)\ Y_i = \alpha + \beta\, Typhoon_i + e_i$$

where Y_i is the risk preference score and $Typhoon_i$ is an indicator variable that captures whether the individual played the game after the typhoon or not (0=pre-typhoon, 1=post-typhoon). The coefficients α is the risk preference score pre-typhoon and β is the change in risk preference score post-typhoon. All regressions also control for a vector of individual traits that are expected to be unaffected by the typhoon but are likely to influence individuals' risk preferences, such as the respondent's gender, household head status, age, household size, education, marital status, employment status, measures of math skills, risk experience, network strength[9], and whether they live on the coastline or not. In a simple randomized experiment, controlling for covariates that are likely to influence the outcome does not affect the expected value of an estimate of β, but it can reduce its variance (Duflo et al., 2006). Covariates that might have been affected by the typhoon, such as number of assets and access to safe drinking water, are not included.

In a second estimation, we regress the insurance choice on the typhoon indicator variable, such that in Equation (1), Y_i is the insurance take-up status and the coefficients α is the probability that an individual chooses insurance pre-typhoon and β is the change in probability of an individual choosing insurance post-typhoon. We run two separate regressions for the two setups, individual insurance and group insurance. All regressions also control for individual characteristics and game rounds. We estimate Equation (1) using a linear probability model.

To more accurately identify an individual's exposure to the typhoon, we identify those municipalities that are within the 50-KM radius of the path of the typhoon. These municipalities within the 50-KM radius of the typhoon were declared by the Government of the Philippines as being in a state of calamity (NDRRMC, 2013). We

[9] Network strength is measured as number of friends, relatives, neighbors, and barangay officials the respondents know.

consider those individuals in municipalities that are within the 50-KM radius as being severely affected by the typhoon and those outside of this range as moderately affected by the typhoon.[10] The following regression is estimated separately for risk preferences and insurance take-up:

(2) $Y_i = \alpha + \beta_1 SeverelyAffectedbyTyphoon_i + \beta_2 ModeratelyAffectedbyTyphoon_i + e_i$

4.6 Results

4.6.1 Descriptive evidence

We provide descriptive results of our central findings in Table 4.4 in terms of average risk preference score and average insurance take-up in the pre-typhoon and post-typhoon sample respectively. In Panel A, we see that levels of risk-loving is higher in the post-typhoon sample. The mean risk preference score for the pre-typhoon sample is 3.525, which is in line with previous findings from the Philippines (Biener et al., 2015; Pradhan, 2014). Post-typhoon, individuals are more risk-loving. From Figure 4.3 (see Appendix C), we see that compared to pre-typhoon (green), a higher proportion of individuals select the riskiest lottery post-typhoon (white). These results are in line with previous studies. They show that risk attitudes are not stable and that they change over time (Andersen et al., 2008). Moreover, several studies show that unfavorable shocks tend to change risk aversion (Cameron and Shah, 2012; Gloede et al., 2012). The results from the two measures of risk preferences show that those in the post-typhoon sample are significantly more risk-loving.

Panel B reports the average insurance take-up in the pre-typhoon and post-typhoon sample respectively. Firstly, we see that insurance take-up in the experiment is quite high, with 62% of those in individual insurance and 65% of those in group insurance opting to choose insurance pre-typhoon. The results are generally in line with that from previous experimental studies that find a majority of the participants choose insurance (Turner et al., 2014; Galarza and Carter, 2010). Post-typhoon, take-up of individual insurance increases by 8 percentage points and group insurance decreases significantly by 10 percentage points. The results are also depicted graphically in Appendix D, Figure 4.4.

[10] We also use a second measure of the severity of the typhoon impact based on the proportion of population affected in the municipalities. We find that the two measures are identical.

4.6.2 Main results

Risk preferences

We find that the typhoon has a significant impact on risk aversion, causing individuals to become more risk-loving after the typhoon, as seen in Panel A of Table 4.5. The results are robust to the inclusion of covariates. The results are in line with studies by Eckel et al. (2009), Page et al. (2012) and Li et al. (2011) who examine the immediate impact of natural disasters on risk preferences. Eckel et al. (2009) explain the risk-loving choices of individuals post-Hurricane Katrina by the effect of the traumatic experience on the subjects' psychological state. Decision-making under stress leads to oversimplifying categories and using simpleminded decision rules (Janis, 1993), which might prevent individuals from analyzing the full set of gambles presented and focus on a simplistic rule such as "choose the gamble that can give the highest payoff" (Eckel et al., 2009, p. 111). Li et al. (2011) find that people are not always more risk averse after a disaster when examining the effects of heavy snow-hit and a major earthquake in China. Page et al. (2012) also find that victims of the 2011 Australian floods (Brisbane) are more likely to opt for a risky gamble, which they explain as being consistent with Prospect Theory predictions of adopting risk-loving attitude after facing a large loss.

We further look at the impact of the typhoon severity on risk preferences in Panel B of Table 4.5. We find that those who are severely and moderately affected are both more significantly risk-seeking. The magnitude is slightly higher for those who are moderately affected but not significantly different from those who are severely affected.

Insurance take-up

We analyze the typhoon's impact on insurance take-up using a linear probability model, as the dependent variable is a binary variable. All specifications cluster standard errors at the individual level. In the linear regression, as seen in Panel A of Table 4.6, we find that the typhoon has a significant impact on insurance take-up, with individual insurance take-up increasing by 13.3 percentage points (column 1). This result is consistent with "availability bias", that people are more likely to purchase insurance immediately after a loss (Johnson et al., 1993; Kunreuther, 1996; Browne and Hoyt, 2000; Kunreuther and Pauly, 2005). In an experimental study similar to ours, Turner et al., (2014) find that flood-affected individuals demand significantly more experiment 'insurance' compared to non-flood affected individuals in Pakistan.

The theory of salience by Bordalo et al. (2012) can help explain how individuals exhibit risk-loving behavior and yet buy insurance. As described by Taylor and

Thompson (1982, p.175), "salience refers to the phenomenon that when one's attention is differentially directed to one portion of the environment rather than to others, the information contained in that portion will receive disproportionate weighting in subsequent judgments."[11] Bordalo et al. (2012) apply this idea to decisions under risk and call those payoffs that draw the decision maker's attention "salient". They note, "the decision maker is then risk-seeking when a lottery's upside is salient and risk-averse when its downside is salient" (p. 1244). In our experiment, for the lotteries to elicit risk preferences, the possibility of winning a greater amount, i.e., the upside is more salient such that individuals are more risk-seeking. In case of the insurance choice, the possibility of losing a large amount, i.e., the downside is more salient such that individuals are more risk-averse and choose to buy insurance. Hence, the theory of salience can help explain why individuals exhibit both risk-seeking and risk-averse behavior. As mentioned earlier, large-scale shocks have been found to induce individuals to react emotionally (Loewenstein et al., 2001). Elgin (2007) notes that emotions are sources of salience, and that they might make individuals notice elements they would otherwise miss. It is likely that the typhoon increases the salience of gains and losses after individuals have experienced such a traumatic event involving real-life losses.

For group insurance, we find that take-up decreases significantly by 11.8 percentage points post-typhoon (column 2). The results are rational in that the mutual loss sharing aspect of group insurance is less attractive following a large-scale disaster that affects entire communities. Research has shown that natural disasters can lead to a decreased rate of cooperation and public goods provision (Belfor, 2014). In as much as the typhoon changes cooperative behaviors, this might be reflected in the lower take-up of group insurance.

Next we consider whether the impact of the typhoon on insurance depends on the severity of the typhoon impact. We find that those in individual insurance who are severely affected by the typhoon are significantly more likely to take-up insurance, as seen in Panel B, Table 4.6. For group insurance, take-up decreases significantly for those who are moderately affected. The differences in severely and moderately affected regions might indeed not be accurate representation of the actual impact of the typhoon. It could be that the moderately affected communities are downstream communities that suffer more due to flooding caused by the typhoon. The measure we have for the intensity of the typhoon only takes into account the distance from the path of the typhoon due to data limitations on detailed topographical information. As mentioned earlier, the impact of the typhoon most likely varied depending on the

[11] Bordalo et al. (2012) cite the same source in their paper.

distance to the coast, elevation, the shape of the coast, etc. This might indeed have important implications for policy, especially for targeting post-disaster recovery programs. It is possible that those regions closer to the path of the typhoon are less affected compared to downstream communities that are further away from the typhoon's path.

4.6.3 Possible channels of treatment effects

Exploring the channels through which the typhoon might have impacted insurance take-up, we find that the typhoon has a significant negative impact on assets and access to safe drinking water in Table 4.7. In particular, the typhoon leads to a decrease of more than one type of asset and also reduces access to safe drinking water by 7.8 percentage points. In Table 4.8, we investigate whether types of assets and access to safe drinking water are associated with insurance take-up. We find that assets and access to safe drinking water are significantly negatively related with insurance take-up in individual and group insurance respectively. Assets and access to safe drinking water may be indicators of household's vulnerability, as it is widely used as an indicator of human vulnerability (Moss et al., 2001; Brenkert and Malone, 2005). In this case, the results indicate that less vulnerable individuals are significantly less likely to take-up insurance.

4.6.4 Other perceptions

Next we look at the impact of typhoon on other perceptions such as uncertainty avoidance, fatalism, trust in insurance, perceived price fairness of insurance, perceived protection from insurance, belief in reciprocity, risk avoidance, and experience with finance. As these perceptions are measured post-game, we control for individual covariates as well as whether the individuals are in individual or group insurance. In Table 4.9, we find that those in the post-typhoon group have lower experience with finance. The results make sense as it is likely that shocks, such as the typhoon, that lead to severe financial losses are also likely to expose gaps in ones own financial experiences, particularly if individuals have low savings, limited access to credit, etc.

4.7 Conclusion

Using exogenous variation in exposure to Typhoon Haiyan, we show that natural disasters have a significant impact on individuals' behavior. Individuals are more risk-loving after the typhoon, which is in line with previous research examining the impact of natural disasters on risk preferences in its immediate aftermath. We also find that individuals affected by the typhoon increase their take-up of individual insurance and

decrease their take-up of group insurance. The results are rational in that the mutual loss sharing aspect of group insurance is not attractive following a large-scale disaster that affects entire communities. While we cannot test whether the natural disaster changed cooperative behaviors, it might be one of many ways in which the impact of the disaster on group insurance take-up operates. Exploring the channels through which the typhoon might have impacted insurance take-up, we find that the typhoon has a significant negative impact on assets and access to safe drinking water. Assets and access to safe drinking water may be indicators of household's vulnerability, as it is widely used as an indicator of human vulnerability. In this case, the results indicate that less vulnerable individuals are significantly less likely to take-up insurance.

Our results regarding individuals' risk-loving behavior and insurance demand post-typhoon might appear paradoxical but can in fact be explained by the theory of salience by Bordalo et al. (2012). As Bordalo et al. (2012) note, a decision maker is risk-seeking when a lottery's upside is salient and risk-averse when its downside is salient. In our experiment, the possibility of winning a greater amount in the lottery to elicit risk preferences, i.e., the upside is more salient such that individuals are more risk-seeking. In case of the insurance choice, the possibility of losing a large amount, i.e., the downside is more salient such that individuals are more risk-averse and choose to buy insurance. It is likely that the salience of gains and losses are heightened in the aftermath of the typhoon.

Our results have implications for post-disaster assistance and recovery programs. To the extent that experimentally elicited preferences align with real-life preferences, the results here would suggest that disaster recovery programs should focus on providing support that utilize the risk-seeking nature of individuals after experiencing a disaster, for example, fostering entrepreneurial activities through provisions of loans or credits. The results also suggest that insurance in post-disaster period might be viewed more favorably.

The study also points to several areas of research that would help us understand the impact of natural disasters on individuals' decision-making. As further inquiry, future research could look into how risk preferences change over time following a large-scale shock. For example, how long does the risk-seeking behavior after the experience of a disaster last? What are the specific channels through which the impact of a disaster experience affects risk preferences? In what other ways are individuals and communities affected by disaster experience, besides the economic loss? What implications does this have on other types of behavior such as trust and cooperation

within a community? A more detailed study of these questions would enable the design of more effective disaster recovery programs as well.

4.8 Tables

Table 4.1: Experimental values and payouts

Panel A: Experimental values				
Initial endowment (in PHP)	300			
Loss probability without self-protection	0.40			
Loss probability with self-protection	0.20			
Self-protection cost (in PHP)	20			
Loss (in PHP)	200			
Deductible (in PHP)	100			
Premium (in PHP)	50			
Panel B: Payouts (in PHP)				
	No insurance (for both individual insurance and group insurance)	Individual insurance	Group insurance	
			Peers take same decision	Peers take different decisions
EV without	220	210	210	220
self-protection *(SD)*	*(98)*	*(49)*	*(35)*	*(32)*
EV with	240	210	210	200
self-protection *(SD)*	*(80)*	*(40)*	*(28)*	*(32)*

Table 4.2: Summary statistics and balance check for traits unaffected by the typhoon

	Sample mean (1)	Pre-typhoon (2)	Post-typhoon (3)	Equality of means *p*-value (4)
Individual characteristics				
Female	0.78	0.77	0.80	0.46
	(0.41)	(0.42)	(0.40)	
Age	38.89	39.17	38.51	0.55
	(10.15)	(10.29)	(9.99)	
Household head (1=yes)	.31	0.30	0.32	0.75
	(0.46)	(0.46)	(0.47)	
Household size	3.82	3.81	3.82	0.95
	(1.94)	(1.88)	(2.02)	
Financially responsible (1=yes)	0.97	0.97	0.97	0.64
	(0.17)	(0.18)	(0.16)	
Education (years completed)	12.27	12.30	12.24	0.85
	(2.96)	(3.00)	(2.90)	
Married (1=yes)	0.79	0.80	0.78	0.78
	(0.41)	(0.40)	(0.41)	
Employed (1=yes)	0.40	0.39	0.41	0.57
	(0.49)	(0.49)	(0.50)	
Own land (1=yes)	0.13	0.14	0.11	0.51
	(0.33)	(0.34)	(0.32)	
Own house (1=yes)	0.88	0.85	0.91	0.10
	(0.33)	(0.36)	(0.29)	
Math score (out of 8)	5.96	6.00	5.91	0.70
	(1.89)	(1.94)	(1.82)	
Faced any shocks in the past three years (except the typhoon)	0.68	0.69	0.66	0.53
	(0.47)	(0.46)	(0.48)	
PhilHealth Insurance (1=yes)	0.55	0.58	0.51	0.21
	(0.50)	(0.50)	(0.50)	
Coastline	0.27	0.16	0.42	0.00***
	(0.45)	(0.37)	(0.50)	
		Panel B: Typhoon damages		
Proportion of houses damaged in the province	12.29	13.73	10.4	0.13
	(20.17)	(21.34)	(18.43)	
Observations	*352*	*200*	*152*	

Notes: This table reports sample means and tests for balance between the pre and post-typhoon groups. Panel A gives sample means for traits that are not likely to be affected by typhoon. Panel B reports the proportion of houses damaged in the province, as given by the NDRRMC (2013). Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 4.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4.3: Summary statistics for typhoon-affected traits

	Sample mean (1)	Pre-typhoon (2)	Post-typhoon (3)	Equality of means *p*-value (4)
	Panel A: Traits that are potentially affected by typhoon			
Individual characteristics				
Types of assets (out of 31)	6.44	6.99	5.72	0.00***
	(3.33)	(3.47)	(3.01)	
Safe drinking water	0.87	0.90	0.82	0.03**
	(0.34)	(0.30)	(0.38)	
Individual income (annual) (in 1000 PHP)	22.89	23.34	22.30	0.85
	(51.97)	(54.46)	(48.67)	
Skipped meals in the past 3 months	0.14	0.15	0.13	0.72
	(0.35)	(0.35)	(0.34)	
Network				
Network size	380.80	380.75	380.86	1.00
	(471.71)	(497.50)	(437.07)	
Network support in emergency[a]	3.98	4.05	3.90	0.11
	(0.88)	(0.89)	(0.85)	
Financial support from network[b]	0.83	0.84	0.80	0.17
	(0.27)	(0.25)	(0.29)	
Observations	*352*	*200*	*152*	

Notes: This table reports sample means between the pre and post-typhoon groups for typhoon-affected traits. Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 4. [a]Mean network support received from relatives and friends within and outside barangay, neighbors, and barangay officials. [b]Mean financial support received from relatives and friends within and outside barangay, neighbors, and barangay officials.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4.4: Difference in risk preferences and insurance take-up

	Pre-typhoon	Post-typhoon	Equality of means *p*-value	Observations
	Panel A: Risk preferences			
Risk-loving (out of 6)	3.52	4.07	0.00***	352
	(1.76)	(1.58)		
Risk-avoiding (out of 7)	5.37	4.92	0.03**	352
	(1.81)	(1.91)		
	Panel B: Insurance take-up			
Individual insurance	0.62	0.70	0.06*	528
	(0.49)	(0.46)		
Group insurance	0.65	0.55	0.01**	528
	(0.48)	(0.50)		
Equality of means *p*-value	0.23	0.00***		
Observations	600	456		

Notes: This table reports the average differences in mean risk preferences (Panel A) and mean insurance take-up (Panel B) together with Student's t-test statistics with standard deviations.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4.5: Impact of typhoon on risk preferences

Panel A: Typhoon and risk preferences		
	(1)	(2)
Typhoon (0=pre-typhoon, 1=post-typhoon)	0.541***	0.549***
	(0.179)	(0.191)
Intercept	3.525***	3.352***
	(0.125)	(0.752)
R^2 adj.	0.022	0.003
Panel B: Typhoon severity and risk preferences		
Severely affected	0.475***	0.516***
	(0.231)	(0.238)
Moderately affected	0.589***	0.586***
	(0.211)	(0.266)
Intercept	3.525***	3.363***
	(0.125)	(0.753)
R^2 adj.	0.020	0.000
Panel C: Model		
Individual covariates	No	Yes
Observations	352	352

Notes: This table reports the impact of the typhoon (Panel A) and typhoon severity (Panel B) on individuals' risk preferences. The dependent variable is the risk preference score as measured with Binswanger lottery. Clustered individual-level standard errors are given in parentheses beneath each point estimate.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 4.6: Impact of typhoon on insurance take-up

	Individual Insurance	Group Insurance
	(1)	(2)
Panel A: Typhoon and insurance take-up		
Typhoon (0=pre-typhoon, 1=post-typhoon)	0.133**	-0.118**
	(0.062)	(0.061)
R^2 adj.	0.068	0.036
Panel B: Typhoon severity and insurance take-up		
Severely affected	0.272***	-0.029
	(0.081)	(0.073)
Moderately affected	0.025	-0.267***
	(0.080)	(0.088)
R^2 adj.	0.083	0.050
Panel C: Model		
Individual covariates	Yes	Yes
Game rounds	Yes	Yes
Observations	528	528

Notes: This table reports the impact of the typhoon (Panel A) and typhoon severity (Panel B) on individuals' decision to take-up insurance in the game. The dependent variable in both panels is an indicator for whether the respondent chose insurance or not. Clustered individual-level standard errors are given in parentheses beneath each point estimate.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 4.7: Impact of typhoon on assets and safe drinking water

	Assets		Safe drinking water	
	(1)	(2)	(3)	(4)
Panel A: Average treatment effects				
Typhoon (0=pre-typhoon, 1=post-typhoon)	-1.268***	-1.278***	-0.078**	-0.070**
	(0.346)	(0.357)	(0.038)	(0.038)
Intercept	6.985***	-1.177	0.900***	0.935***
	(0.245)	(1.321)	(0.021)	(0.163)
Panel B: Model				
Individual covariates	No	Yes	No	Yes
R^2 adj.	0.033	0.146	0.010	-0.013
Observations	352	352	352	352

Notes: This table reports the impact of the typhoon on individuals' assets and access to safe drinking water. Clustered individual-level standard errors are given in parentheses beneath each point estimate.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 4.8: Assets, access to safe drinking water, and insurance take-up

	Individual Insurance	Group Insurance
	(1)	(2)
Panel A: Insurance take-up		
Assets	0.015	0.013
	(0.011)	(0.012)
Access to safe drinking water	0.231	-0.018
	(0.200)	(0.103)
Typhoon	0.455*	0.326**
	(0.240)	(0.148)
Assets*Typhoon	-0.036*	-0.004
	(0.019)	(0.019)
Access to safe drinking water*Typhoon	-0.075	-0.456***
	(0.234)	(0.118)
R^2 adj.	0.089	0.066
Panel B: Control variables		
Individual covariates	Yes	Yes
Game rounds	Yes	Yes
Observations	528	528

Notes: This table reports the association between assets, safe drinking water, and insurance take-up. The dependent variable is insurance take-up in Panel A. Clustered individual-level standard errors are given in parentheses beneath each point estimate.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 4.9: Impact of typhoon on other perceptions

	Uncertainty avoid	Fatalism	Trust Insurance	Price Fairness	Insurance Protection	Belief in Reciprocity	Risk avoidance	Finance experience
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Typhoon	0.072	-0.394	0.088	-0.051	0.185	0.020	-0.073	-0.412***
	(0.094)	(0.300)	(0.153)	(0.170)	(0.133)	(0.102)	(0.140)	(0.150)
Individual covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insurance treatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2 adj.	0.021	0.026	0.055	0.031	0.018	0.037	0.033	0.082
Observations	352	352	352	352	352	352	352	352

Notes: This table reports the impact of the typhoon on several different attitudes and perceptions. Clustered individual-level standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix A

Elicitation of risk preferences

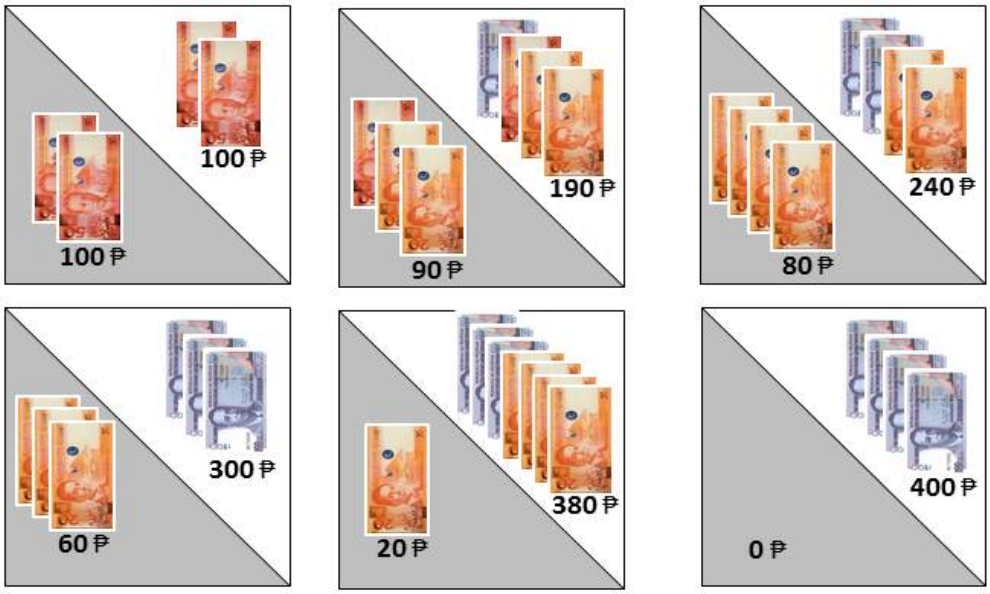

Figure 4.2: Binswanger (1980) lottery for eliciting risk preferences

Table 4.10: Binswanger (1980) lottery and estimated distribution of risk aversion

	Lottery characteristics				Parameter range of risk aversion ϱ[a]	
Choice	High payoff (PHP)	Low payoff (PHP)	Expected value	Variance in Payoffs	Lower bound	Upper bound
1 (safe)	100	100	100	0	7.51	inf
2	190	90	140	50	1.74	7.51
3	240	80	160	80	0.81	1.74
4	300	60	180	120	0.32	0.81
5	380	20	200	180	0	0.32
6 (risky)	400	0	200	200	- inf	0

[a] Based on CRRA EU of the functional form $u(c) = (c^{1-\rho})/(1-\rho)$ with risk parameter $\rho > 0$ for risk-averse individuals.

Appendix B

Summary statistics

Table 4.11: Summary statistics and balance check for individual and group insurance

	Sample Mean (1)	Individual Insurance (2)	Group Insurance (3)	Equality of means *p*-value (4)
Female	0.78	0.82	0.75	0.12
	(0.41)	(0.39)	(0.43)	
Age	38.89	38.45	39.30	0.45
	(10.15)	(9.79)	(10.51)	
Household head	.31	0.27	0.34	0.17
	(0.46)	(0.45)	(0.48)	
Household size	3.82	4.12	3.51	0.00***
	(1.94)	(2.08)	(2.02)	
Financially responsible	0.97	0.95	0.98	0.13
	(0.17)	(0.21)	(0.13)	
Education (years completed)	12.27	12.19	12.34	0.63
	(2.96)	(3.17)	(2.74)	
Married	0.79	0.79	0.79	1.00
	(0.41)	(0.41)	(0.41)	
Employed	0.40	0.39	0.40	0.82
	(0.49)	(0.49)	(0.50)	
Own land	0.13	0.13	0.12	0.75
	(0.33)	(0.34)	(0.33)	
Own house	0.88	0.86	0.89	0.33
	(0.33)	(0.35)	(0.31)	
Skipped meals in the past 3 months	0.14	0.16	0.12	0.28
	(0.35)	(0.37)	(0.33)	
Variety of assets (out of 31)	6.44	6.50	6.37	0.70
	(3.33)	(3.37)	(3.30)	
Access to safe drinking water	0.87	0.86	0.87	0.88
	(0.34)	(0.34)	(0.34)	
Individual income (annual) (in 1000 PHP)	22.89	24.60	21.18	0.54
	(51.97)	(57.83)	(45.46)	
Math score (out of 8)	5.96	5.97	5.95	0.96
	(1.89)	(1.90)	(1.88)	
Risk aversion (out of 6)	3.76	3.76	3.76	0.98
	(1.71)	(1.76)	(1.66)	
Faced any shocks in the past three years	0.68	0.69	0.66	0.65
	(0.47)	(0.46)	(0.47)	
PhilHealth Insurance	0.55	0.55	0.56	0.83
	(0.50)	(0.50)	(0.50)	
Coastline	0.27	0.32	0.23	0.06*
	(0.45)	(0.47)	(0.42)	
Network size	380.80	415.36	346.25	0.17
	(471.71)	(445.98)	(494.96)	
Network support in emergency[a]	3.99	3.93	4.03	0.30
	(0.88)	(0.87)	(0.88)	
Financial support from network[b]	0.82	0.83	0.82	0.92
	(0.27)	(0.27)	(0.27)	
Observations	*352*	*176*	*176*	

Notes: This table reports sample means as well as the means for individual and group insurance setups. Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 4. [a]Mean network support received from relatives and friends within and outside barangay, neighbors, and barangay officials. [b]Mean financial support received from relatives and friends within and outside barangay, neighbors, and barangay officials.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix C

Risk preferences

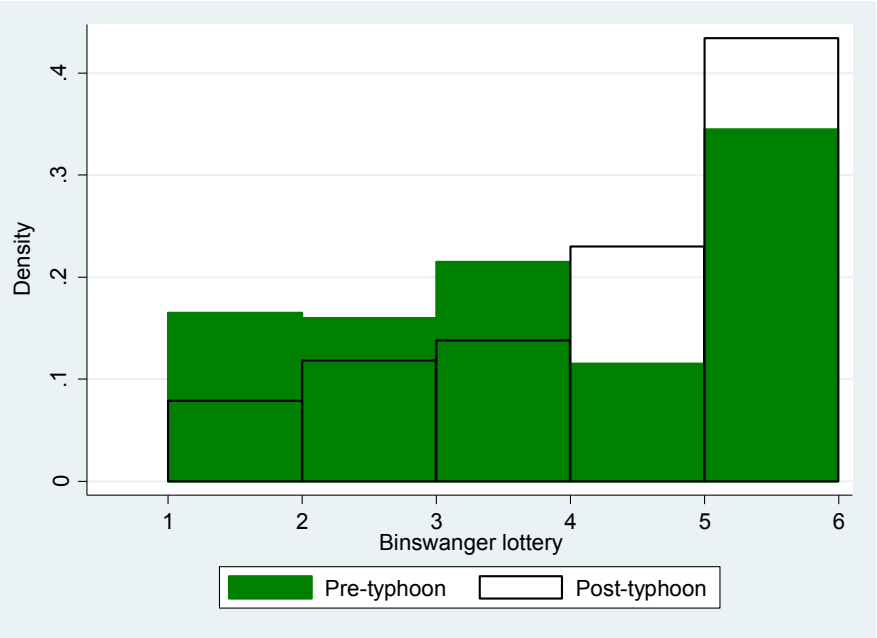

Figure 4.3: Proportion of individuals by lottery choice (pre- versus post-typhoon)

Appendix D

Insurance take-up and self-protection in individual and group insurance

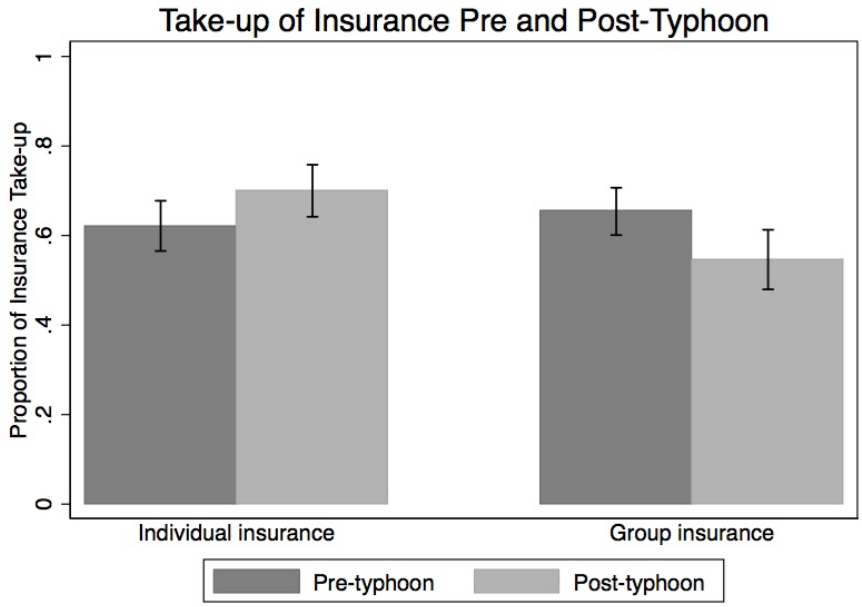

Figure 4.4: Insurance take-up in individual and group insurance pre- and post-typhoon

Chapter 5

Do Experimental Insurance Games Impact Real-life Insurance Enrollment for the Poor? Evidence from the Philippines*

Abstract

This paper evaluates how playing an experimental insurance game affects real-life insurance enrollment for the poor. Experimental insurance games not only allow individuals to learn about insurance, but also experience it. Based on a lab-in-the-field experiment in the rural Philippines involving an insurance game in 2010, complemented by a follow-up survey in 2013, I find that playing the insurance game significantly increases enrollment in the country's social health insurance scheme, particularly in the scheme targeted towards the poorest 25 percent of the population. Two insights from behavioral economics – the role of emotions in financial decision-making and the role of "nudges" or behavioral policy interventions that help people overcome procrastination – can help explain the impact of the experimental game on real-life insurance enrollment.

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5.1 Introduction

Conducting field experiments to understand human behavior has become increasingly popular in economic research (Harrison and List, 2004; Levitt and List, 2009; Viceisza, 2012). One of the appeals of field experiments is that they allow researchers to observe how people actually make choices (Viceisza, 2012). It is natural then to ask whether field experiments themselves affect people's subsequent choices once the experiment is over. For this purpose, I examine the impact of a lab-in-the-field experiment[1] involving insurance games on participants' real-life insurance enrollment.

It is plausible to imagine that participating in lab-in-the-field experiments induce changes in later behavior that are not intended by the experimenter. Research in social cognition has shown that beliefs, attitudes, goals, and behavior can be unconsciously affected as part of research processes (Machin and Fitzsimons, 2005). Psychology and marketing research has also long recognized that surveying a subject can induce later behavioral change by making certain risks or choices more salient than they would be otherwise (Zwane et al., 2011). A causal relationship between completing a household survey and subsequent behavioral change has been documented using health field experiments (Zwane et al., 2011). Such unintended consequences can be beneficial or harmful depending on the context. For example, if lab-in-the-field experiments involving insurance games give participants a favorable view of insurance in a region where insurance fraud is common, then consequent behavioral change might prove to be more harmful than beneficial.

To examine the impact of a lab-in-the-field experiment on subsequent behavior change, I rely on an experiment conducted in 2010 in the rural Philippines and a follow-up survey conducted three years later in 2013. The lab-in-the-field experiment involved playing an insurance game and was designed to test the impact of different insurance products on solidarity in risk-sharing groups among rural villagers (Landmann et al., 2012). The game included a risk component and an insurance component[2], and lasted approximately half a day. In the process, the game also allowed participants to experience and learn about insurance.

The results from the follow-up survey show that those who participated in the game in 2010 are 6.6 percentage points more likely to have enrolled in the Philippine Health Insurance (PhilHealth) scheme in 2013 compared to the enrollment rate of 45.4

[1] Harrison and List (2004) offer a comprehensive overview of field experiments. They also propose the following taxonomy of field experiments: artefactual field experiment, framed field experiment, and a natural field experiment. Artefactual field experiments are also termed lab-in-the-field experiments.

[2] The insurance game was not framed in the type of insurance offered.

percent in the control group. PhilHealth is the Philippines' social health insurance scheme that aims to provide universal health insurance coverage. PhilHealth has five different plans, one of which—the Sponsored Program—targets the poorest 25% of the Philippines' population. Under the Sponsored Program, premiums are covered, but enrollment is voluntary (Silfverberg, 2014). The results confirm that those who played the game are more likely to enroll in the Sponsored Program than those who did not play the game.

To investigate the channels of the impact, I consider several outcomes related to attitudes and knowledge. When comparing the outcomes for the treated and the control groups, I find that the game has a significant effect on risk attitudes, with those who played the game in 2010 displaying more risk aversion than the control group. This is as opposed to Cai and Song (2015) who find no impact of insurance games on risk attitudes. The opposing result could be because Cai and Song (2015) consider immediate impact whereas I consider a long-term impact on risk attitudes. Although the results suggest that the game treatment leads to increased risk aversion, it is not possible to disentangle whether this effect is purely due to playing the game or stems from enrolling in insurance after playing the game. The experimental game has no impact on insurance knowledge or perceived probability of future disasters, which is consistent with Cai and Song (2015). As suggested qualitatively by Patt et al. (2009) that experimental games might help build trust, I test whether the game has an impact on trust in insurance providers and find no impact.

Two insights from behavioral economics shed some light on why we might see an impact of experimental games on real-life decision-making. First is the role of emotions in financial decision-making. There is significant evidence linking remembered, experienced, and anticipated emotions with the decision-making process (Patt et al., 2009). Hence, game participants might be more open to enrolling in insurance when encountered with this decision in real-life, having previously experienced insurance albeit in an experimental setting. A second theoretical insight comes from the idea of "nudges" that is, behavioral policy interventions that help people help themselves (Thaler and Sunstein, 2008; Baicker et al., 2012). As such, participating in games might give people the push they need to overcome procrastinating (Baicker et al., 2012).

The studies that come closest to the present study is by Gaurav et al. (2011), Norton et al. (2012), and Cai and Song (2015). In Gaurav et al. (2011), participants are offered a financial literacy training involving insurance games and then offered a choice of

insurance following the training. The training and education program increase take-up by 5.3 percentage points, relative to a take-up rate in the control group of 8.7 percent. Norton et al. (2012) conduct experimental insurance games in Ethiopia to examine whether the games lead to increase in take-up of index insurance. Insurance is offered as part of a larger program run by a development agency together with insurance companies to help poor farmers manage risks better. The authors observe an increase in take-up from 15.75 percent in the control group to 20.36 percent in the treatment group. Cai and Song (2015) play insurance games with farmers in rural China who are then asked to think about whether they would like to buy the insurance and that the experimenters would come back a few days later to ask them for their purchase decision. The purchase decision is conveyed to their partner insurance company, who then collects the premium. The authors find that playing insurance games with farmers in rural China increases take-up of insurance by 9.6 percentage points, which is a 46 percent increase relative to the baseline take-up rate of 20 percent. In both studies, the primary motivation was to test the impact of insurance games on insurance take-up, and as such insurance choice was offered right after the insurance games as part of the study design.

The present study differs from the aforementioned studies in two major ways: firstly, insurance decision in the present study is completely independent of the game and occurs at no prescribed timing. Secondly, this study tests whether the effects persist over a period of three years as compared to a few hours or a few days. Offering insurance choice as part of the experiment, which is what has been done in previous studies, lends to two limitations. First, when insurance is made readily available as part of the experiment, this ignores the transaction costs, such as long waiting lines, traveling times, etc. that present a formidable barrier to insurance take-up in many cases. Hence, this does not accurately reflect demand for insurance. Second, offering insurance choice as part of the experiment can create experimenter demand effect i.e., participants choose the decision they think the experimenters would like them to take. Moreover, in case of Cai and Song (2015), the insurance premium was deducted from an agricultural subsidy that all study subjects were eligible for, which solves the problem of liquidity constraints (Olapade and Frölich, 2012). As the present study looks at insurance enrollment in the country's social health insurance scheme, it circumvents the aforementioned limitations. Moreover, the results in previous studies are limited to the short-term, so we do not know whether take-up rates persist a few years down the line.

This study also contributes to a growing literature on the role of financial literacy training programs in enabling individuals to make financial decisions. As Viciesza (2012) notes, lab-in-the-field experiments can also serve as an educational tool. As such, experimental games can be considered as part of a broader program geared towards improving financial literacy. Carter (2008) and Hill and Viciesza (2012) have highlighted this anecdotally for experiments involving index-based insurance contracts in developing countries. These authors report that experiments also serve the purpose of explaining difficult concepts, such as how insurance contracts work, to rural farmers with low levels of financial literacy; however, the lab-in-the-field experiments in their studies were not designed for this purpose. Cai and Song (2015) test for the impact of their insurance game on insurance knowledge and find that it does not have an impact. Hence, the results are still inconclusive regarding the impact of insurance games on insurance knowledge.

The results here provide suggestive evidence of how financial literacy programs directly and indirectly influence insurance enrollment. Studies on insurance enrollment in low-income populations reveal several prominent barriers to it, including limited financial literacy (Acharya et al., 2013; Eling et al., 2014). Health shocks have significant negative effects on the poor's financial situation (Islam and Maitra, 2012; Wagstaff and Lindelow, 2014). Many low- and middle-income countries have implemented social health insurance schemes to alleviate the financial burden of healthcare. However, enrollment in such schemes tends to be very low, especially among the poorest segment of the population (Acharya et al., 2013). The results of this analysis will thus be useful to insurers and policymakers engaged in using financial literacy programs to make insurance more familiar and understandable to the rural poor.

The structure of the paper is as follows. Section 5.2 discusses the extant literature on how insurance games influence insurance enrollment, and also includes a discussion of possible channels for this effect. Section 5.3 presents information on the institutional background, including the country and health sector context, PhilHealth's Sponsored Program, and the survey setting. Section 5.4 discusses the research design and the main hypotheses of the paper. Section 5.5 focuses on the empirical results. Section 5.6 offers behavioral explanations for the results and section 5.7 concludes.

5.2 Related literature

Experimental insurance games can be thought of as part of a broader concept of financial literacy programs. "Financial literacy" is the ability to make informed

decisions about financial planning, wealth accumulation, debt, and pensions (Lusardi and Mitchell, 2007a, 2007b, 2014). Vast public and private resources have been devoted to financial literacy programs in developed and developing countries alike (Carpena et al., 2011). These programs, which are aimed at improving financial literacy, generally provide information on different financial products, such as credit, savings, insurance, and budgeting (Carpena et al., 2011). They range from programs that focus on traditional teaching methods to those that use interactive games designed to give participants hands-on experience with the products. Insurance literacy programs are a subset of financial literacy programs and focus exclusively on insurance education (Olapade and Frölich, 2012).

Improving financial literacy is motivated by the idea that doing so will help households make better-informed financial decisions and result in an increased demand for welfare-enhancing financial services (Lusardi and Mitchell, 2007a, 2007b, 2014). Evidence from developed countries indicates a positive association between financial literacy and insurance demand (Hecht and Hanewald, 2010; Cappelletti et al., 2013). Research on the link between financial literacy and demand for insurance in emerging countries also suggests a correlation between financial literacy and insurance demand (Xu and Zia, 2012; Cole et al., 2013).

To evaluate causal impact, several researchers have implemented financial literacy initiatives in the field. Financial literacy training programs tend to be one of two types—a traditionally taught program involving detailed explanation of the product, or a participatory-based approach involving games (De Bock and Gelade, 2012). There is no consensus as to which type of program is more effective (Patt et al., 2010) (see Table 5.7 in Appendix A for a comprehensive list of studies comparing traditional and participatory financial literacy initiatives).

The participatory approach programs involve insurance games that give participants a chance to experience insurance products in a setting where they are exposed to hypothetical shocks. Insurance games, which were developed out of laboratory experiments to study economic behavior, often involve multiple rounds so that individuals can learn to grasp complex situations with which they were previously unfamiliar (Carter et al., 2008). Carter et al. (2008) played a series of games in Peru and Kenya where almost 60 percent and 100 percent, respectively, of the participants purchased insurance in the game. Similarly, Patt et al. (2010) conducted insurance games with farmers in Ethiopia and Malawi and conclude that better understanding of insurance correlates with greater willingness to purchase insurance. Gaurav et al.

(2011) find evidence of a positive effect of their financial literacy program on insurance adoption in India. Norton et al. (2014), who conducted experimental games in Ethiopia, report that participants display a preference for insurance over other risk management strategies. Finally, Cai and Song (2015) also find that playing insurance games with farmers in rural China increases willingness to enroll in insurance. The limitations of the aforementioned studies are that it is not clear whether willingness to enroll and enrollment in insurance when it is offered within the experiment translates into enrollment in the real world.

There are a growing number of studies on financial literacy programs and their impact on demand for financial products, but the focus of this work is mostly on impact evaluation and not much attention is given to the mechanisms of impact (Carpena et al., 2011). Identification of causal mechanisms requires assumptions that might not necessarily hold.[1] Hence, studies attempting to explore causal mechanisms consider the impact of financial literacy training on possible channels without identifying the indirect effect of the treatment via these channels (Carpena et al., 2011; Olapade and Frölich, 2012; Cai and Song, 2015). Evidence from financial literacy programs generally suggests that these programs increase knowledge about insurance products (Tower and McGuiness, 2011) and alter attitudes toward insurance (Olapade and Frölich, 2012). However, the overall effect on insurance enrollment is mixed, with some studies finding a positive effect (Cai et al., 2011; Giné et al., 2011) and others finding no effect (Bonan et al., 2012; Clarke and Kalani, 2012).

This paper provides additional insight into the causal mechanism. In evaluating the channels, I first consider the impact of the insurance game on insurance knowledge. The results from previous studies are mixed: Tower and McGuiness (2011) find that financial literacy seems to increase knowledge of insurance products; however, Olapade and Frölich (2012) and Cai and Song (2015) find no impact from insurance literacy on insurance knowledge, which is in line with results from this study. Next, I consider the impact of the insurance game on insurance attitudes, particularly on insurance as a form of protection. Carpena et al. (2011) and Olapade and Frölich (2012) both note that while education might not have an immediate impact on knowledge, it might impact attitudes towards financial products more easily because many financial choices involve calculations and comparisons of costs and benefits, which can be difficult for individuals with low levels of education. However, I do not

[1] See Huber (2014) and Flores and Flores-Lagunes (2009) for a detailed look at why, even in experiments, causal mechanisms are not easily identified. The main challenge is that even under random treatment assignment, subsequent selection into the mediator is generally nonrandom, such that causal mechanisms are identified only when controlling for confounders of the mediator and the outcome (Huber, 2014).

find an impact of the experimental game on insurance attitude. This could be precisely because attitudes are more easily changed and as such spillovers between the treated and the control groups could attenuate any impact of the game.

I also assess the game's impact on trust in insurance providers. Patt et al. (2009) examine the role of experimental games in establishing and building trust. They argue qualitatively that insurance games are not only a way to gauge interest in the product, but also are valuable for building trust. Testing quantitatively, I find no impact of the game on trust in insurance providers. Moreover, in line with Cai and Song (2015), I consider whether the game has any impact on participants' risk attitudes and their perceptions of the probability of future disasters. Whereas Cai and Song (2015) find that the game has no impact on changes in risk attitudes or changes in perceived probability of disasters, I find that the game leads to a significant increase in risk aversion. The difference in results could be because they measure risk aversion in the short-term as opposed to the long-term view taken in this paper.

Overall, relating experimental games to financial literacy, which is a much more developed field of study, enable us to understand causal mechanisms better. This study thus contributes to understanding causal mechanisms through which experimental games impact behavioral change, a topic that to date has been relatively unexplored (Carpena et al., 2011). This area of study deserves more attention, especially given the global growth of financial literacy programs in recent years.

5.3 Institutional background

5.3.1 Country and health sector context

The Republic of the Philippines is a lower-middle-income country with a population of 94.9 million (Chakraborty, 2013) and national average family income of 235,000 Pesos[2] (NSO, 2012). The country has experienced sustained economic growth since 2001, with growth in 2013 recorded at 7.2% (Chua et al., 2014). However, poverty is not decreasing in line with this growth, changing just barely from 26.3 percent in 2009 to 25.2 percent in 2012, suggesting that higher growth has yet to benefit many of the poor (Chua et al., 2014). The informal sector is large, comprising 50 percent of the population (Chakraborty, 2013). While health outcomes at the aggregate level have improved significantly in the Philippines, inequalities in health outcomes are worsening (Chakraborty, 2013).

[2] Equivalent to approximately USD 5375.12 as of August 2014, at an exchange rate of 1 USD = 43.72 Pesos.

The Philippines has one of the longest histories of social health insurance in Southeast Asia with its roots going back to the 1970s when the country introduced the Medicare Program for formal-sector employees (Lavado, 2010). While Medicare was initially intended to expand coverage to informal-sector workers as well, the program was not successful at enrolling other groups (Chakraborty, 2013). In 1995, PhilHealth, the Philippines' social health insurance scheme, was established to provide universal health insurance coverage (PHIC, 2012).

PhilHealth has five plans: (1) the Overseas Worker Program for overseas contract workers, (2) the Employed Program for employees in the government and private sector whose premiums are jointly covered by the employee and the employer, (3) the Individually Paying Program for self-employed professionals who voluntarily contribute to the program, (4) the Lifetime Program for retirees and pensioners, and (5) the Sponsored Program for indigents, that is, the poorest 25% of the Philippines' population, whose premiums are covered by the national government and local government units or by private individuals and companies (PHIC, 2012).

5.3.2 PhilHealth 'Sponsored Program'

The PhilHealth plan most relevant for the sample in this study is the Sponsored Program, which is targeted at the poor. To enroll in the Sponsored Program, a person needs to go to the local office of the Department of Social Welfare and Development, which will then determine whether the individual is qualified to join the program and, if so, endorse the person appropriately (PHIC, 2012). To qualify, the person must belong to the lowest, income-wise, 25 percent of the Philippine population or be listed in the National Household Targeting System for Poverty Reduction. Those who are not listed can still avail themselves of the Sponsored Program via the "point-of-care enrollment program" (PHIC, 2013). This program targets the poor nonmembers who are confined in government hospitals. The premiums are paid by the sponsoring hospital. In addition, the local government units can fully or partially subsidize the membership of persons not listed as poor. The list is based on a proxy means test that estimates family income based on various socioeconomic variables such as ownership of housing, education of the household head, livelihood of the family, and access to water and sanitation facilities, among others (Fernandez and Olfindo, 2011). While the local government units are encouraged to enlist their indigent constituents in the program, enrollment by households can still be considered voluntary (Silfverberg, 2014).

***Coverage**:* The Sponsored Program may cover households or individuals depending on the category to which a person belongs. The following members of the household are covered under PhilHealth without additional premiums: legal spouse, child or children, and parents who are 60 years old and above (PHIC, 2012).

Barriers to enrollment: Although coverage by the Sponsored Program has expanded over the past few years,[3] the majority of provinces experience mild to extreme leakages in the program. A significant number of families not part of the targeted indigent population are included and many truly poor households are excluded from the program (Silfverberg, 2014; PIDS, 2010). Factors that contribute to this under-coverage are related to lack of hospital services, availability of health professionals, and governance of the local government units that are ultimately responsible for enrollment. A study on underutilization of PhilHealth services reveals a lack of knowledge about PhilHealth benefits as well as a cumbersome and unmanageable process, which add to the transaction costs of enrollment, as prime contributors to this situation (Faraon et al., 2013).

5.3.3 Setting

The study was conducted in the Iloilo province of the Western Visayas. Educational attainment in this province is slightly below the national average, poverty is higher, and public health insurance coverage is about average (Landmann et al., 2012). Average annual family income in the region is 204,000 Pesos (NSO, 2014). Iloilo province had a population of 1.8 million in 2013 and an average household size of 4.8 (NSO, 2014). To my knowledge, there are no changes in the PhilHealth registration process between the time of the insurance game in 2010 and the follow-up survey in 2013.

5.4 Research design

5.4.1 Experimental game

The study is based on a randomized lab-in-the-field experiment in 2010 that involved playing an insurance game. The experiment was originally designed to test the impact of different insurance products on solidarity in risk-sharing groups among rural villagers (Landmann et al., 2012). As Landmann et al. (2012) describe in their paper, the game in 2010 includes a risk component and an insurance component, and lasted

[3] The actual coverage of the PhilHealth Sponsored Program is unclear; PhilHealth reports universal coverage. An independent study, however, estimates that PhilHealth coverage is only 52%, and the latest demographic and health survey reports that coverage is only at 38% (PIDS, 2010).

approximately half a day.[4] At the beginning of the game, every participant receives an initial endowment of 200 Pesos. There are three different options or treatments. Within each treatment, risk is introduced via rolling a dice where the outcome of the dice roll decides whether and how much a participant is allowed to keep of her initial endowment. If the dice roll shows a 1, 2 or 3, then there is no loss; 4 or 5 implies a medium shock where participants lose half of their endowment i.e., 100 Pesos; and 6 implies a catastrophic shock where participants lose almost everything i.e., 180 Pesos. The three treatments include one without insurance, option A, and two with insurance coverage, options B and C. The two insurance treatments vary in their premiums and the type of losses covered. Option B costs 45 Pesos and half of all losses are covered whereas option C costs only 20 Pesos and half of only the catastrophic loss is covered. The game is played in three rounds but the payout is based on the results of one round only, which is chosen randomly after all three rounds have been completed. Before the start of the game, the game instructor explains the game to all participants together with graphical instructions. The participants are asked a set of questions to test their understanding of the game. If a participant makes a mistake, the research assistants explain the setup and the concepts one more time. Only those who answered all questions correctly were allowed to participate. Only a few participants were excluded. The complete experimental procedure is given in Landmann et al. (2012).

5.4.2 Data collection

The experiment was conducted in the fall of 2010 with low-income households in rural or semi-urban areas.[5] A two-stage random sampling procedure was employed whereby in the first stage a sample of 24 barangays (lowest administrative level in the Philippines, comparable to a village) was randomly selected. In the second sampling stage, eight households were randomly chosen within each barangay after obtaining a complete list of households from the barangay officials. Only the household head or the spouse of a household head was allowed to take part in the game. The household heads were asked to bring two peers along. The sample size varied from 15 to 24 per village. The total number of observations is 513.[6] Table 5.9 in Appendix C reveals that the invited and the peer groups in 2010 are balanced along a number of household and individual characteristics. Hence, I consider all 513 observations as part of the treated sample in 2010.

[4] In what follows, the description of the game in 2010 is adapted from Landmann et al. (2012).
[5] The description of data collection for the 2010 game is adapted from Landmann et al. (2012). The number of barangays and total participants in Landmann et al. (2012) is smaller as they exclude their two pre-test barangays. Like Landmann et al. (2012), those over the age of 70 are not considered.
[6] Of the total respondents invited, compliance was very high as most of those invited attended the game.

A follow-up survey of the game participants was conducted at the end of 2013, together with a survey of a randomly selected control group from the same barangays. At the time of the experiment in 2010, no control group was surveyed; hence in 2013, from each of the 24 barangays, a randomly selected sample of 18 to 24 individuals per barangay was chosen to create the control group. A great deal of care was taken to ensure that those in the control group in 2013 are from the pool of those from whom the treatment group in 2010 was chosen. In particular, only those who had been living in the barangay in 2010 were randomly chosen. The control group is comprised of 575 observations. The follow-up survey collected information on socio-demographic characteristics; social networks; shocks and insurance purchase and experience; math, numeracy, and probability skills. Math skills were tested using a set of eight questions as in Cole et al. (2013), probability skills using a set of two questions as in Weller et al. (2013), and numeracy skills using a set of three questions as in Schwartz et al. (1997) (see Appendix B, Table 5.8, for the questions).

Of the 513 original participants, 458 (89.3%) were contacted. Table 5.10 in Appendix D provides information on attrition. About half the respondents who could not be reached had either migrated domestically or abroad; the other half could not be found either because they were not available at the time of the interview or because they had passed away. If attrition was correlated with treatment assignment and thus differed between treated and control group, then this could potentially bias the impact estimates. However, looking at the reasons of attrition, it seems highly unlikely that the insurance game led to participants migrating or not being around for the interview.

5.4.3. Summary statistics

As the game was played in 2010, during the follow-up survey, the game participants were asked how much of the game they remembered. More than 25% of the participants said that they remembered all or most of the game and over 60% reported remembering some of the game.

Household characteristics

Panel A of Table 5.1 presents household characteristics for the treated and control groups. Column 1 presents the sample mean for a series of characteristics. The average household size is 4 and average annual household income is about 96,230 Pesos, which is far below the national average of 235,000 Pesos but similar to the average household income of the poorest 20 percent in the Philippines, which is 92,000 Pesos (NSO, 2012). More than 60 percent of the households reported having savings. More than a quarter of individuals reported skipping meals in the past three months for

financial reasons, which provides an indication of poverty. A majority of respondents own their dwelling (88%), have access to safe drinking water[7] (69%), and have access to improved sanitation[8] (78%).

Individual characteristics

In terms of individual characteristics, the sample is mostly female (66%) and married (80%), as seen in Panel B of Table 5.1. Close to half the respondents are household heads and more than 95% are involved in financial decision-making in the household. Respondents are around 44 years old and have completed 11 years of schooling. The average annual income is approximately 28,000 Pesos. Individuals scored very high on fatalism.[9] I also administered short tests of math, numeracy, and understanding probabilities, which are strongly correlated with financial literacy (Carpena et al., 2011). The average respondent correctly answered 6 out of 8 questions on math skills and 1 out of 2 questions on understanding probabilities. Respondents fared worse on numeracy skills, with the average respondent answering none of three questions correctly.

When asked if they had experienced any shocks (health, fire, theft, agricultural price changes, and weather) in the past three years, the average respondent said he or she had experienced more than one shock. About 64% of the respondents reported having experienced health shocks in the past three years. Other commonly experienced shocks were bad weather conditions affecting agriculture and livestock (approximately 40%) and agricultural price changes affecting agricultural inputs (approximately 30%) (see Table 5.11 in Appendix D). When asked about their most important coping mechanisms for health shocks, 64% of the respondents indicated borrowing money and 25% reported using own financial resources (see Table 5.12 in Appendix D). Only 3% indicated using insurance as a coping mechanism. A vast majority of the respondents (86%) noted lack of money as their primary reason for not buying insurance, followed by lack of trust (5%) (see Table 5.13 in Appendix D). Only about 2% of the respondents reported lack of knowledge as a reason for not buying insurance. However, since the Sponsored Program of PhilHealth is offered for free, the results from the survey indicate that individuals actually have little knowledge of the program.

[7] Access to safe drinking water was assessed based on whether the households indicated having piped water, obtained water from a protected well, or used bottled water.

[8] Access to improved sanitation was assessed based on whether the households indicated having a private flush toilet or a closed pit latrine.

[9] Fatalism is measured by evaluating responses to two items: "I have little control over what will happen to me in my life" and "Good things tend to happen to other people, not to me or my family."

In terms of social contacts, respondents, on average, reported knowing five barangay officials. Having contact with barangay officials is an important indicator of one's social status in the village and may also influence insurance enrollment as barangay officials carry out the administrative process of enrolling members in PhilHealth.

To test for balance across groups, Columns 2 and 3 of Table 5.1 present the means in the control and treatment groups, respectively. Column 4 presents the *p*-value for a *t*-test of the equality of means across the two groups. As to differences in household characteristics (Panel A), the groups appear balanced overall, as expected due to the randomized assignment to treatment. Furthermore, most of the individual characteristics are also balanced across the two groups, except for age, number of shocks experienced**,** and math ability (see Panel B of Table 5.1). Those in the treatment group are slightly older than the control group, even though great care was taken to ensure that the control group in 2013 is taken from the pool that was eligible to participate in the game in 2010. One possible reason for this age difference is that in the 2010 treatment group, the household received the invitation and either the household head or the spouse could attend the game. In the 2013 control group, the person who was randomly selected was interviewed. If in the 2010 game the older household heads or older spouses attended the game, then age would be higher in the treatment group. Moreover, math ability is also slightly higher in the treatment group than in the control group. However, other indicators of mental ability, such as education, probability skills, and numeracy skills, are not different for the two group; hence, it is hard to explain the difference in math skills between the two groups.

In addition, the self-reported type of shocks experienced in the past three years is slightly higher in the treatment group than in the control group. The proportion of those in the treatment group reporting health shocks is higher than those in the control group. I check to see whether there is any correlation between age and self-reported shocks as it is likely that older participants have experienced more types of shocks. However, I find that there is no correlation between age and types of shocks. As these are self-reported shocks, it could be that the treatment and the control group perceive shocks differently due to their participation (or not) in the game. Olapade and Frölich (2012) also find that the shock history for death and hospitalization between the treatment and the control group is different and suggest that the control group might be underreporting such health events compared to the treated group, which might be a direct result of the treatment.

As income is an important criterion in determining enrollment status in the Sponsored Program, it is important that not only the means of individual income and household income across treatment and control groups are balanced, but also that overall distribution is similar. Figure 5.1 (see Appendix E) shows that distributions of both individual and household income look very similar.

5.5 Results

This section presents the results from the experiment, also referred to as the "game." Randomization of game assignment in 2010 allows measuring the causal impact of the insurance game on different outcome variables. The cross-section estimator, which compares mean outcomes of participants and non-participants at time t, gives unbiased estimates under the assumption that selection into treatment is exogenous (Heckman, LaLonde, and Smith, 1999).

5.5.1 Impact on insurance enrollment

I first analyze the game's impact on insurance enrollment and indicators related to enrollment. The average impact of the game on insurance enrollment will be estimated using the following equation:

$$(1)\ Y_i = \alpha + \beta Game_i + \theta X_i + e_i$$

where Y_i is an indicator for whether or not the individual is enrolled in the PhilHealth scheme and $Game_i$ is an indicator variable that captures whether the individual played the game in 2010. X_i includes individual- and household-level covariates. In a simple randomized experiment, controlling for covariates that are likely to influence the outcome does not affect the expected value of an estimator of β, but it can reduce its variance (Duflo et al., 2006). Individual-level covariates include respondent's age, gender, education, household head status, whether the respondent is responsible for household financial decision-making, and measures of math, probability, and numeracy skills. Household-level covariates are household size and whether the household owns its dwelling. Covariates that might have been affected by the treatment are not included. The covariates are selected based on previous literature that highlights the relevance of these factors in insurance demand and take-up (Eling et al., 2014).

Table 5.2 presents OLS estimation results of Equation (1). Those who participated in the game in 2010 are 6.6 percentage points more likely to have enrolled in the PhilHealth scheme in 2013. The effect of the game is significant across all models in

which individual- and household-level covariates are included as well. As a robustness test, I estimate an additional probit regression model, the results of which are presented in Table 5.15 in Appendix G. The model estimates confirm those of the linear probability model. In a separate analysis, I estimate the impact of the game on just those participants who were invited to play the game in 2010 compared to the control group I created in 2013. However, the small sample size is restrictive in terms of being able to detect any significant effects; the point estimates of the coefficients, however, are similar, as see in Table 5.14 in Appendix F. Therefore, I focus on the results for the total sample of everyone who played the game in 2010.

Table 5.3 shows the change in PhilHealth enrollment from 2010 to 2013. There is a significant increase in the proportion of the treatment group enrolled in PhilHealth in 2013 compared to 2010.

Next, considering the game's impact on enrollment in the Sponsored Program, I find that those who participated in the game in 2010 are 8.5 percentage points more likely to have enrolled than those in the control group, as shown in Table 5.4. The effect of the game is also significant across all models in which individual- and household-level covariates are included. The results from a probit regression model (see Table 5.16 in Appendix G) confirm those of the linear probability model.

5.5.2 Channels of game impact

As the game's impact on PhilHealth enrollment is significant, I explore the possible channels through which this impact might occur. As discussed in Section 5.2, I consider the impact of the game[10] on insurance knowledge; insurance, trust, and risk attitudes; and perceived probability of future disasters.

Insurance knowledge

Insurance knowledge is measured by asking three questions related to payouts from health insurance in case of health shocks, adapted from Cole et al. (2013), who measure insurance knowledge in the case of rainfall insurance. The first question is: "Suppose you buy health insurance that costs 500 Pesos for one year and covers medical bills up to 1500 Pesos. If you do not fall sick this year, will the insurance give you back your money that you used to buy insurance?" The second question is: "If you fall sick and your medical bills are worth 1400 Pesos, will the insurance company

[10] For all the analyses, I also include the impact of the hypothetical shocks administered during the game on the different outcomes; however, none of the effects are significant. This is to be expected as the game was played three years previously; moreover, the shocks in the game were not framed such that respondents were free to give the shocks an individual-specific interpretation.

cover any amount of your medical bills?" And the third question is: "If you fall sick and your medical bills are worth 1800 Pesos, how much of the medical bills will the insurance company cover?" The results for the three knowledge items are reported in Panel A of Table 5.5. The coefficients of the game treatment are small, mostly negative, and insignificant. The results are in line with Olapade and Frölich (2012) and Cai and Song (2015), who also find no impact of insurance literacy on insurance knowledge. The questions to test insurance knowledge required some computations, which might have made it hard for participants to answer them correctly. Future studies could look at more basic insurance knowledge questions to test whether experimental games impact basic knowledge.

Insurance attitude

To estimate attitudes toward insurance, I look at the extent to which respondents view insurance as a form of protection. More specifically, perception of insurance as a form of protection is measured via a three-item questionnaire with a seven-point scale, as in Bosmans and Baumgartner (2005). The three items are: (1) An insurance policy can prevent problems; (2) With an insurance policy, I obtain a sense of security; and (3) An insurance policy is able to protect me. The coefficient of the game treatment for attitude toward protection is insignificant. Including individual- and household-level covariates does not change the significance of the coefficients. This is in contrast to the finding of Olapade and Frölich (2012); however, they measure attitude immediately after the insurance literacy program, whereas this study looks at attitude three years after the game.

Trust

To measure trust, I look at trust in insurance providers. Trust in insurance is measured via a three-item questionnaire with a seven-point scale taken from Bruner et al. (2005). The three items are: (1) Insurance companies can be trusted; (2) Insurance companies are honest and truthful; and (3) I have great confidence in insurance companies. Panel C of Table 5.5 shows that the coefficients of the game treatment for trust are insignificant. The results do not change with the inclusion of individual- and household-level covariates. Thus, there is no evidence that the game treatment leads to increased trust in insurance. The results are in contrast to Patt et al. (2009); however, they only suggest that games might improve trust but provide no empirical evidence in support of this idea.

Risk attitudes

In line with Cai and Song (2015), I consider the insurance game's impact on participants' risk attitudes. A variety of methodologies, ranging from simple to complex, are available to assess risk attitudes and choosing which methodology to employ depends on the study sample (Charness et al., 2013). In this study, I use both experimentally elicited risk preferences as well as a simpler method utilizing a questionnaire. For the first method, risk attitudes are elicited using a Binswanger-type (1980) lottery where participants are asked to choose between six lotteries (see Figure 5.2 in Appendix I) that vary in risk and expected return, as shown in Table 5.18 (see Appendix I). A second measure of risk attitudes, based on a three-item questionnaire with a seven-point scale, was also employed (Quintal et al., 2006). The three items are: (1) I avoid risky things; (2) I only make a decision when I think I can predict the outcomes; and (3) I would rather be safe than sorry.

The results from the first measure indicate that participating in the game leads to an increase in risk aversion of 0.28 points. Results from the second measure indicate that participating in the game leads to a 0.5-point increase in the risk aversion score; however, when individual- and household-level covariates are included, the significance of the second risk measure disappears.

Previous studies show that risk attitudes are not stable and that they change over time (Andersen et al., 2008). Moreover, several studies show that unfavorable shocks tend to increase risk aversion (Gloede et al., 2012; Cameron and Shah, 2015). If people are more aware of shocks either because of participating in the game or because they have enrolled in an insurance plan, then it is likely that, over time, we might see an increase in risk aversion for those who participated in the game. Although the results suggest that the game treatment leads to increased risk aversion, it is not possible to disentangle whether this effect is purely due to playing the game or stems from enrolling in insurance after playing the game. Hence the results from this analysis need to be viewed with some caution.

Perceived probability of disasters

To assess perceptions of future disaster probabilities, the participants were asked two questions:[11] "What do you think is the probability of a disaster that leads to severe loss of property next year?" and "What do you think is the probability of a disaster that leads to at least one member of the family falling severely ill next year?" In line with

[11] Cai and Song (2015) ask the following question: "What do you think is the probability of a disaster that leads to a more than 30 percent yield loss next year?" As the sample in this paper is not solely comprised of farmers, the question on yield loss would not have been appropriate for all; hence, I modified the question to be more general.

Cai and Song (2015), to make the concept of probability more understandable to the respondents, a simple exercise involving 10 balls, each representing a 10% probability, was employed: participants chose the number of balls they thought represented the disaster probability. The coefficients of the game treatment for perceived probability of future disasters are insignificant. The results do not change with the inclusion of individual- and household-level covariates. Thus, there is no evidence that the game treatment leads to an increase in perceived probability of future disasters. This is in line with Cai and Song (2015), who also find that the game has no impact on perceived probability of future disasters.

5.5.3 Heterogeneity of treatment effect

I next test the heterogeneity of the treatment effect to see whether the magnitude of the game effect varies across different socioeconomic characteristics, such as gender, marital status, age, education, and income. Previous research indicates that gender, age, education, income, and availability of risk-sharing alternatives, which might be higher for married couples given that they can jointly face any risk, are relevant for insurance demand and take-up (Eling et al., 2014).

Table 5.6 investigates the possible heterogeneous response to the game. Columns 1 and 2 report results of game effects for females and those less than 40 years of age, respectively. Column 3 shows the results of game effects for those who are married, Column 4 for those who have less than 10 years of schooling, and Column 5 for those who have annual household income of less than the average national annual household income of 69,000 Pesos for the poorest decile (NSO, 2012). The results show that individuals from poorer households are less likely to benefit from the game. Although poorer households and individuals are more likely to be negatively affected by any shock, they might also have less means to invest in insurance, thus preventing them from benefiting from the game. There are no significant differences in game effects by gender, marital status, or education. The results are robust to the inclusion of covariates, as shown in Table 5.17 in Appendix H. The coefficient and the level of significance for the interaction term with income do not change; coefficients for other terms change slightly but the levels of significance do not.

5.6 Behavioral explanations

The field of behavioral economics sheds some light on why we might see an impact of the game on real-life enrollment. Two insights from this field are particularly relevant in the context of games and decision-making.

The role of emotions in financial decisions

As Patt et al. (2009) note, there is significant evidence linking remembered, experienced, and anticipated emotions with the decision-making process. Hence, it is likely that insurance games that allow participants to experience shocks and insurance coverage, albeit in a hypothetical setting, might affect decision-making processes just by triggering some emotions, which, unfortunately, cannot be measured in this study. Moreover, simply participating in the game might make one more open to enrolling in insurance, especially when it is offered for free. In the absence of financial barriers, those who participate in financial literacy programs may be more likely to take-up insurance when they are offered the opportunity to enroll. Unfortunately, it is not possible to test this possible channel of personality change after playing the game, but it could explain how games affect enrollment in fully subsidized insurance schemes.

Nudging

A second theoretical insight comes from the work of O'Donoghue and Rabin (1999), who argue that while conventional economic models assume exponential discounting, that is, a person's relative preference for well-being at an earlier date over a later date is the same, a more accurate model is one that adopts hyperbolic discounting, that is, people put more weight on the present than on the future (Currie, 2006). In the case of enrolling in social programs where the costs are upfront, be these monetary costs or transaction costs arising from putting together necessary documents, waiting in line, and so forth, and the benefits are in the future, the model provides useful insight (Currie, 2006). A person with time-inconsistent preferences thus might put off enrolling in a public health insurance program where the benefit might not even be needed until a future health shock occurs (Currie, 2006). To the extent that insurance games act as "nudges" that is, behavioral policy interventions that help people help themselves (Thaler and Sunstein, 2008; Baicker et al., 2012), participating in games might give people the push they need to overcome procrastinating.

5.7 Conclusion

This paper contributes to the understanding of how field experiments influence real-life financial decisions. Lab-in-the-field experiments can be useful learning tools by not only providing information, but also allowing participants to experience the financial products. Insurance games as a type of financial literacy tool have the potential to increase participants' familiarity with insurance, hence leading to higher acceptance of insurance. While previous studies find a significant positive effect of insurance games on insurance take-up rates, the results are based on offering insurance choice within the experiment and might be applicable only in the short term. This study investigates the long-term impact on decision-making of participating in lab-in-the-field experiments. Moreover, I consider possible channels though which games might impact take-up rates, namely, insurance knowledge and attitudes. Future research looking at *utilization* of PhilHealth's services, instead of enrollment only, could provide a deeper understanding of the impact of such games. Such an analysis might also be useful for the design of financial literacy initiatives aimed at introducing the poor to insurance solutions.

Considering that enrollment in social health insurance schemes in many low- and middle-income countries remain dismally low, understanding barriers to insurance enrollment remains a significant task. The results of this analysis provide suggestive evidence of how insurance games directly and indirectly influence insurance enrollment. Studies on financial literacy programs suggest that there is significant scope for improvement. While in terms of cost-effectiveness, insurance games might fall in the higher end of financial costs spectrum, integrating such games into already existing financial literacy training programs might prove to be more feasible. The results here will thus be useful to insurers and policymakers engaged in using such programs to make insurance more familiar and understandable to the rural poor.

A major challenge in studying the impact of financial literacy programs is designing the programs to be studied: What should they include? How long should they be? How should they be taught? The impact of financial literacy training program depends not only on the structure of the program itself, but also on the population to which it will be offered. Moreover, there is no fixed definition of what financial literacy training means, as it can vary from one-day consultation sessions in the field to extensive in-class training over a period of one to two years. This variability in programs makes it difficult to discover which features are most effective. This study enhances our understanding of what kinds of programs might be most useful to participants who have low levels of education and income.

Another important lesson from this study is that, as researchers, we can have a significant impact on our subjects, whether this is intended or not. With the growth of field experiments, this is an important aspect to keep in mind. While the main objective of the insurance game played in 2010 was to assess subjects' social behavior in light of insurance availability, the game had further consequences for the participants in the form of actual enrollment in insurance. This might be desirable in cases where the objective is to encourage enrollment so as to benefit the target population; however, in cases where insurance providers cannot be trusted, such an outcome would be less than desirable.

5.8 Tables

Table 5.1: Summary statistics and balance check for treated and control groups

	Sample mean (1)	Control group (2)	Treatment group (3)	Equality of means *p*-value (4)
		Panel A: Household characteristics		
Household size	4.17	4.09	4.27	0.18
	(2.13)	(2.11)	(2.16)	
Log of household income (annual) (in Pesos)	10.83	10.77	10.90	0.18
	(1.57)	(1.66)	(1.44)	
Household has savings	0.61	0.61	0.61	0.98
	(0.48)	(0.48)	(0.48)	
Skipped meals in the past 3 months	0.28	0.27	0.29	0.56
	(0.44)	(0.44)	(0.45)	
Household owns house	0.88	0.88	0.87	0.43
	(0.32)	(0.31)	(0.33)	
Access to safe drinking water	0.69	0.69	0.70	0.88
	(0.46)	(0.46)	(0.46)	
Access to improved sanitation	0.78	0.77	0.79	0.28
	(0.41)	(0.42)	(0.40)	
		Panel B: Individual characteristics		
Female	0.66	0.66	0.70	0.16
	(0.46)	(0.47)	(0.45)	
Married	0.80	0.79	0.81	0.33
	(0.40)	(0.40)	(0.39)	
Financially responsible	0.96	0.96	0.97	0.45
	(0.19)	(0.20)	(0.17)	
Age	44.13	42.06	46.72	0.00***
	(11.68)	(10.99)	(12.01)	
Education (years completed)	11.16	11.24	11.06	0.44
	(3.60)	(3.67)	(3.5)	
Log of individual income (annual) (in Pesos)	6.85	6.79	6.92	0.65
	(4.68)	(4.75)	(4.59)	
Fatalism (out of 14)	9.79	9.7	9.9	0.34
	(3.03)	(3.06)	(2.99)	
Math score (out of 8)	6.04	5.96	6.15	0.09*
	(1.81)	(1.83)	(1.78)	
Probability score (out of 2)	1.00	0.98	1.02	0.43
	(0.76)	(0.75)	(0.76)	
Numeracy score (out of 3)	0.62	0.59	0.65	0.20
	(0.72)	(0.68)	(0.76)	
Types of self-reported shocks in the past 3 years	1.36	1.30	1.42	0.07*
	(1.07)	(1.08)	(1.07)	
Self-reported health shocks in the past 3 years	0.64	0.61	0.67	0.05*
	(0.49)	(0.49)	(0.49)	
No. of barangay officials in contact with[12]	5.24	4.59	5.89	0.10
	(4.78)	(2.77)	(6.12)	
Observations	1,033	575	458	

Notes: This table reports sample means and tests for balance between the treated and control groups in 2013. Panels A and B give sample means for household and individual characteristics, respectively. Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 4.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

[12] Only 73 respondents in the treatment group and 73 in the control group responded "yes" to knowing barangay officials.

Table 5.2: Impact of game on PhilHealth enrollment

Independent variables	(1) OLS	(2) OLS	(3) OLS
	Panel A: Average treatment effects		
Game	0.066**	0.058*	0.054*
	(0.031)	(0.032)	(0.032)
Intercept	0.454***	0.197	-0.004
	(0.021)	(0.119)	(0.132)
	Panel B: Control variables		
Individual controls		Yes	Yes
Household controls			Yes
	Panel C: Model		
Observations	1,033	1,033	1,033
R^2 adj.	0.000	0.012	0.032
Mean of dep. var. (total sample)	0.483	0.483	0.483
SD of dep. var. (total sample)	(0.499)	(0.499)	(0.499)

Notes: This table reports the impact of the game on respondents' decision to enroll in the PhilHealth program. The dependent variable is an indicator for whether the respondent enrolled in the PhilHealth program. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 5.3: PhilHealth enrollment change over time for the treated

	Treatment 2010 **(1)**	**Treatment 2013** **(2)**	**Equality of means p-value** **(3)**
PhilHealth enrollment	0.41	0.52	0.00***
	(0.49)	(0.50)	
Observations	458	458	

Notes: This table reports the mean for PhilHealth enrollment in 2010 and 2013 for those who participated in the game. Column 1 gives the baseline enrollment in the PhilHealth program in 2010 and Column 2 shows enrollment in 2013. Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 3.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 5.4: Impact of game on Sponsored Program enrollment

Independent variables	(1) OLS	(2) OLS	(3) OLS
	Panel A: Average treatment effects		
Game	0.085***	0.075**	0.071**
	(0.031)	(0.032)	(0.031)
Intercept	0.351***	0.319***	0.136
	(0.020)	(0.117)	(0.129)
	Panel B: Control variables		
Individual controls		Yes	Yes
Household controls			Yes
	Panel C: Model		
Observations	1,033	1,033	1,033
R^2 adj.	0.002	0.011	0.032
Mean of dep. var. (total sample)	0.389	0.389	0.389
SD of dep. var. (total sample)	(0.488)	(0.488)	(0.488)

Notes: The dependent variable is an indicator for whether the respondent enrolled in PhilHealth's Sponsored Program. A linear probability model is used. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 5.5: Impact of game on other outcomes

Panel A: Dependent variable = insurance knowledge						
	Knowledge 1 (yes/no)		Knowledge 2 (yes/no)		Knowledge 3 (yes/no)	
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
Game	-0.025	-0.012	-0.026	-0.033	0.000	-0.001
	(0.022)	(0.023)	(0.022)	(0.022)	(0.013)	(0.013)
Intercept	0.165***	0.443***	0.157	0.202*	0.043***	0.016
	(0.016)	(0.112)	(0.015)	(0.107)	(0.009)	(0.070)
Individual controls		Yes		Yes		Yes
Household controls		Yes		Yes		Yes
R^2 adj.	0.000	0.007	0.000	-0.002	-0.001	-0.002
Mean of dep. var. (total sample)	0.154	0.154	0.145	0.145	0.044	0.044
SD of dep. var. (total sample)	(0.361)	(0.361)	(0.352)	(0.352)	(.204)	(.204)
Panel B: Dependent variable = insurance attitude						
	Attitude (out of 21)					
Game	0.299	0.373				
	(0.260)	(0.265)				
Intercept	16.221***	16.411***				
	(0.179)	(1.072)				
Individual controls		Yes				
Household controls		Yes				
R^2 adj.	-0.001	0.011				
Mean of dep. var. (total sample)	16.353	16.353				
SD of dep. var. (total sample)	(4.179)	(4.179)				
Panel C: Dependent variable = trust						
	Trust (out of 21)					
Game	0.303	0.418				
	(0.277)	(0.281)				
Intercept	15.082***	15.366***				
	(0.189)	(1.124)				
Individual controls		Yes				
Household controls		Yes				
R^2 adj.	0.000	0.022				
Mean of dep. var. (total sample)	15.216	15.216				
SD of dep. var. (total sample)	(4.443)	(4.443)				

Note: Table 5.5 to be continued.

Panel D: Dependent variable = risk attitudes						
	Risk 1 (out of 6)		Risk 2 (out of 21)			
Game	0.282**	0.288*	0.549**	0.213		
	(0.113)	(0.116)	(0.252)	(0.259)		
Intercept	3.456***	4.336***	16.603***	14.925***		
	(0.077)	(0.502)	(0.174)	(1.003)		
Individual controls		Yes		Yes		
Household controls		Yes		Yes		
R^2 adj.	0.003	0.006	0.002	0.044		
Mean of dep. var. (total sample)	3.580	3.580	16.847	16.847		
SD of dep. var. (total sample)	(.057)	(.057)	(4.065)	(4.065)		
Panel E: Dependent variable = perceived probability of future disasters						
	Probability 1 (out of 10)		Probability 2 (out of 10)			
Game	0.108	0.154	0.216	0.206		
	(0.191)	(0.195)	(0.176)	(0.176)		
Constant	3.960***	3.486***	2.581***	2.341***		
	(0.126)	(0.830)	(0.116)	(0.710)		
Individual controls		Yes		Yes		
Household controls		Yes		Yes		
R^2 adj.	-0.001	0.028	-0.001	0.026		
Mean of dep. var. (total sample)	4.008	4.008	2.677	2.677		
SD of dep. var. (total sample)	(3.046)	(3.046)	(2.804)	(2.804)		
Observations	1,033	1,033	1,033	1,033	1,033	1,033

Notes: In Panel A, the dependent variables are indicators for whether the respondent correctly answered the insurance knowledge questions. In Panel B, the dependent variable is a measure of the respondent's perceived protection from insurance as measured by a three-item questionnaire with a seven-point scale. In Panel C, the dependent variable is a measure of trust based on a four-item questionnaire with a seven-point scale. In Panel D, the dependent variables are measures of risk attitude where Risk 1 is measured by a Binswanger-type lottery and Risk 2 by a three-item questionnaire with a seven-point scale. In Panel E, the dependent variables are measures of perceived probability of future property and health disasters. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5.6: Heterogeneous response to treatment by socioeconomic characteristics

Independent variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
	Panel A: Heterogeneity of treatment effects				
Game	0.045	-0.014	0.108**	0.152***	0.085**
	(0.055)	(0.066)	(0.039)	(0.044)	(0.040)
Female	-0.091**				
	(0.043)				
Game*female	0.063				
	(0.066)				
Married		0.030			
		(0.048)			
Game*married		0.121			
		(0.074)			
Education (<10 years)			0.081*		
			(0.042)		
Game*education (<10 years)			-0.064		
			(0.063)		
Income (<69,000 Pesos)				0.106***	
				(0.040)	
Game* income (<69,000 Pesos)				-0.126**	
				(0.061)	
Age (<40 years)					-0.078*
					(0.040)
Game*age (<40 years)					-0.025
					(0.062)
Intercept	0.411***	0.328***	0.321***	0.295***	0.387***
	(0.035)	(0.043)	(0.025)	(0.028)	(0.028))
	Panel B: Model				
Observations	1,033	1,033	1,033	1,033	1,033
R^2 adj.	0.009	0.006	0.005	0.009	0.008

Notes: This table reports the heterogeneous effects of participating in the game on respondents' decision to enroll in PhilHealth's Sponsored Program. The dependent variable is an indicator for whether the respondent enrolled in PhilHealth's Sponsored Program. A linear probability model is used. Column 1 includes the main effect and interaction term for female respondents; Column 2 for respondents who are under the age of 40 years; Column 3 for married respondents; Column 4 for respondents who have not completed 10 years of schooling; and Column 5 for those who earn less than 69,000 Pesos annually, which is the average national income. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix A

Comparison of financial literacy initiatives

Table 5.7: Traditional versus participatory financial literacy initiatives

Authors	Research Design	Main Result	Effect of Financial Literacy
	Panel A: Traditional training programs		
Bonan et al. (2012)	Randomized insurance literacy module among households in Thies, Senegal	No impact of literacy module; however, marketing treatment significantly impacts take-up decisions	Not supporting financial literacy
Cai et al. (2011)	Randomized experiments involving educational program in China	Financial literacy when social networks are taken into account has large and significant effects on insurance decision-making	Supporting financial literacy
Carpena et al. (2011)	Randomized a five-week education module in India	Module did not increase participants' ability to perform financial calculation, but was effective in raising awareness of financial matters and in changing attitudes toward financial products	Ambiguous
Cole et al. (2013)	Randomized a short education module for rainfall insurance in India	No significant effect of the education module on demand	Not supporting financial literacy
Dercon et al. (2012)	Randomized experiment including financial literacy training led by a trusted community member	No impact of financial literacy training on insurance demand	Not supporting financial literacy
Giné et al. (2011)	Households grouped into clusters, then treated with either high-intensity or low-intensity financial literacy materials through comics	Farmers in high-intensity clusters were significantly more likely to purchase insurance upon receiving an informative comic; however, receiving a comic had a negligible impact on farmers in low-intensity clusters	Supporting financial literacy
Olapade and Frölich (2012)	A randomized controlled trial of insurance education through brochures in rural Philippines	Positive effect on attitude toward insurance for both treated households and non-treated households influenced by network effects; however, no impact on insurance enrollment	Ambiguous
Tower and McGuiness (2011)	An evaluation of a radio education campaign in Kenya	The radio campaign improved various aspects of understanding insurance	Supporting financial literacy

Note: Table 5.7 to be continued.

Panel B: Participatory training programs			
Cai and Song (2015)	Randomized insurance game in rural China.	Insurance take-up increased by 48% on average	Supporting financial literacy
Carter et al. (2008)	Randomized experimental game in Kenya	100% take-up within the game; however, not sure whether decisions within the game translate into real-life decisions	Ambiguous
Gaurav et al. (2011)	Insurance education module in the form of insurance game administered to randomly selected farmers in Gujarat, India	Significant and positive effect on uptake of insurance, particularly for those with low initial levels of financial literacy	Supporting financial literacy
Patt et al. (2010)	A randomized experiment in Ethiopia and Malawi comparing conventional treatment to an interactive insurance game	Training through role-playing simulation games may be an important tool for improving understanding of insurance; however, it is unclear whether it outperforms conventional training approaches.	Supporting financial literacy

Appendix B

Questionnaire items measuring math, probability and numeracy skills

Table 5.8: Questions for measuring math, probability, and numeracy skills

Panel A: Math skills[13] (8 questions)
How much is 4 + 3?
If you have 20 Pesos and a friend gives you 50 Pesos, how many Pesos do you have?
How much is 35 + 82?
If you have 48 Pesos and someone gives you 58 Pesos, how much money do you have?
What is 3 times 6?
If you have four friends and would like to give each one four sweets, how many sweets must you have to give away?
What is 10% of 400?
Suppose you want to buy food that costs 37 Pesos. You only have one 100 Pesos note. How much change will you get?
Panel B: Probability skills[14] (2 questions)
If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1,000?
If the chance of getting a disease is 20 out of 100, this would be the same as having a ____% chance of getting the disease.
Panel C: Numeracy skills[15] (3 questions)
Imagine that we flip a fair coin 1,000 times. What is your best guess about how many times the coin would come up heads in 1,000 flips? In a lottery, the chances of winning a 500 Pesos prize are 1%. What is your best guess about how many people would win a 500 Pesos prize if 1,000 people each buy a single ticket to the lottery? In another lottery, the chance of winning a car is 20 in 1,000. What percent of lottery tickets win a car?

[13] See Cole et al. (2013).
[14] See Weller et al. (2013).
[15] See Schwartz et al. (1997).

Appendix C

Summary statistics and balance check for invited and peer groups

Table 5.9: Summary statistics and balance check for invited and peer groups

	Sample mean (1)	Peer group (2)	Invited group (3)	Equality of means *p*-value (4)
		Panel A: Household characteristics		
Household size	5.13	5.19	5.01	0.37
	(2.15)	(2.16)	(2.14)	
Log of household income (annual) (in Pesos)	7.90	7.88	7.94	0.33
	(0.68)	(0.67)	(0.71)	
Household has savings (1=yes)	0.22	0.23	0.21	0.59
	(0.42)	(0.42)	(0.41)	
Skipped meals in the past 3 months (1=yes)	0.28	0.29	0.27	0.60
	(0.45)	(0.45)	(0.44)	
Land size (in hectares)	0.16	0.15	0.19	0.51
	(0.66)	(0.73)	(0.50)	
Own livestock (1=yes)	0.32	0.32	0.30	0.54
	(0.47)	(0.47)	(0.46)	
		Panel B: Individual characteristics		
Female	0.69	0.74	0.60	0.00***
	(0.46)	(0.44)	(0.49)	
Married	0.81	0.81	0.80	0.89
	(0.40)	(0.39)	(0.40)	
Regular income (1=yes)	0.24	0.25	0.21	0.38
	(0.43)	(0.43)	(0.41)	
Age	42.95	42.02	44.87	0.01**
	(12.28)	(11.94)	(121.94)	
High school graduate (1=yes)	0.45	0.45	0.45	0.99
	(0.50)	(0.50)	(0.50)	
Number of years living in barangay	31.61	31.17	32.50	0.42
	(17.65)	(17.77)	(17.43)	
Number of church visits per month	2.61	2.62	2.60	0.91
	(1.68)	(1.69)	(1.69)	
PhilHealth enrollment (1=yes)	0.39	0.41	0.35	0.21
	(0.49)	(0.49)	(0.48)	
Health shocks in the past 3 years (1=yes)	0.72	0.72	0.72	0.99
	(0.45)	(0.45)	(0.45)	
Fire in property in the past 3 years (1=yes)	0.02	0.01	0.02	0.45
	(0.13)	(0.12)	(0.02)	
Theft of assets in the past 3 years (1=yes)	0.05	0.05	0.05	0.94
	(0.21)	(0.21)	(0.21)	
Agricultural shocks in the past 3 years (1=yes)	0.39	0.39	0.39	0.86
	(0.49)	(0.49)	(0.49)	
Number of relatives close by	4.37	4.65	3.80	0.24
	(7.60)	(8.27)	(5.97)	
Number of friends close by	9.03	9.36	8.35	0.68
	(25.45)	(29.64)	(13.10)	
Risk preference[a] (out of 10)	7.78	7.72	7.91	0.39
	(2.31)	(2.38)	(2.18)	
Happiness score[b] (out of 10)	6.99	6.93	7.11	0.33
	(1.98)	(2.00)	(1.92)	
Ladder of life score[b] (out of 10)	5.91	5.99	5.75	0.30
	(2.43)	(2.41)	(2.48)	
Observations	513	345	168	

Notes: This table reports sample means and tests for balance between the peer and the invited groups in 2010 using the information gathered from the survey questionnaire in 2010. Panels A and B give sample means for household and individual characteristics, respectively. [a]Risk preference is measured by asking how willing someone is to take risks (on a scale from -5 to 5, which is converted to a scale of 0 to 10). [b]Questions require ranking oneself on a scale from -5 to 5, which is converted to a scale of 0 to 10. Standard deviations are reported in parentheses. The *p*-values of a *t*-test are reported in Column 4.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix D

Attrition, shocks, coping mechanisms, and reasons for not buying insurance

Table 5.10: Attrition

Reasons for attrition	No. of individuals not found
Domestic migration	15
Foreign migration	13
Death	7
Not available for survey/away from barangay	7
Could not find/refused to be interviewed	13
Total observations	**55**

Table 5.11: Most common types of shocks

Types of shocks	Percent of affected individuals
Health	63.79
Fire	0.77
Theft of assets	2.03
Bad weather conditions affecting agriculture	39.40
Price changes for agricultural inputs	29.72
Total observations (1,033)	

Table 5.12: Coping mechanisms for health shocks

Types of coping mechanism	Percent of individuals
Own money	25.00
Borrow	63.84
Gift (village)	1.89
Gift (government/NGO)	1.73
Sell asset	3.14
Insurance	3.30
Consume less	1.10
Total observations (636)	

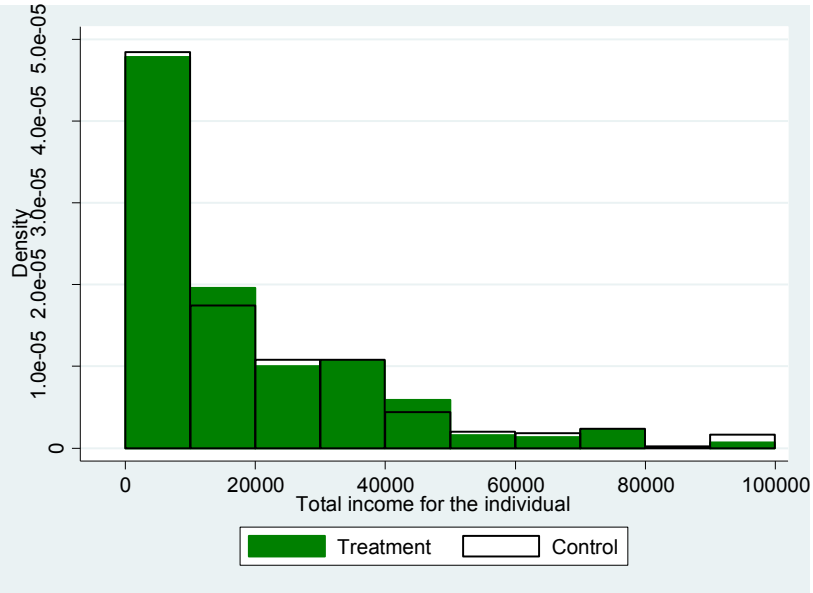
Table 5.13: Reasons for not buying insurance

Reasons for not buying insurance	Percent of individuals
Lack of money	86.01
Not available	3.82
Lack of knowledge	2.08
No trust in insurance	5.20
No time	2.54
No need for insurance	0.35
Total observations (865)	

Appendix E

Comparison of income distribution in treatment and control groups

Panel 1: Distribution of annual individual income across treatment and control groups



Panel 2: Distribution of annual household income across treatment and control groups

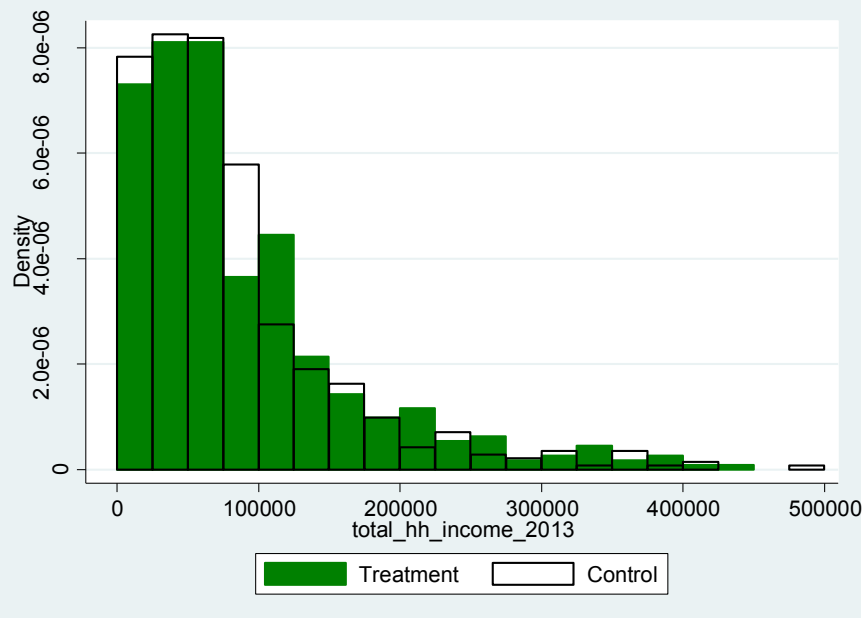


Figure 5.1: Distribution of income across treatment and control groups

Appendix F

Linear estimation

Table 5.14: Impact of game on PhilHealth enrollment for 'invited' participants

Independent variables	(1) OLS	(2) OLS	(3) OLS
	Panel A: Average treatment effects		
Invited to the game	0.046	0.021	0.015
	(0.046)	(0.047)	(0.046)
Intercept	0.454***	0.184	-0.008
	(0.021)	(0.142)	(0.153)
	Panel B: Control variables		
Individual controls		Yes	Yes
Household controls			Yes
	Panel C: Model		
Observations	723	723	723
R^2 adj.	0.000	0.012	0.032

Notes: This table reports the impact of the game for those who were invited on their decision to enroll in the PhilHealth program. The dependent variable is an indicator for whether the respondent enrolled in the PhilHealth program. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix G

Probit estimation

Table 5.15: Probit estmation of game impact on PhilHealth enrollment

Independent variables	(1) Probit	(2) Probit	(3) Probit
	Panel A: Average treatment effects		
Insurance game	0.066**	0.058*	0.055*
	(0.031)	(0.032))	(0.032)
	Panel B: Control variables		
Individual controls		Yes	Yes
Household controls			Yes
Observations	*1,033*	*1,033*	*1,033*

Notes: This table reports the effect of participating in the insurance game on respondents' decision to enroll in the PhilHealth program. The dependent variable is an indicator for whether the respondent enrolled in the PhilHealth program. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5.16: Probit estimation of game impact on Sponsored Program enrollment

Independent variables	(1) Probit	(2) Probit	(3) Probit
	Panel A: Average treatment effects		
Insurance game	0.085***	0.076**	0.072**
	(0.031)	(0.032)	(0.031)
	Panel B: Control variables		
Individual controls		Yes	Yes
Household controls			Yes
Observations	*1,033*	*1,033*	*1,033*

Notes: This table reports the effect of participating in the insurance game on respondents' decision to enroll in PhilHealth's Sponsored Program. The dependent variable is an indicator for whether the respondent enrolled in PhilHealth's Sponsored Program. Robust standard errors are given in parentheses beneath each point estimate.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix H

Heterogeneous response to treatment by socioeconomic characteristics (including control variables)

Table 5.17: Heterogeneous response to treatment by socioeconomic characteristics

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
	Panel A: Heterogeneous treatment effects				
Insurance game	0.027	-0.038	0.088**	0.135***	0.093**
	(0.054)	(0.067)	(0.040)	(0.045)	(0.041)
Female	-0.065				
	(0.052)				
Game*female	0.066				
	(0.065)				
Married		0.021			
		(0.050)			
Game*married		0.135*			
		(0.074)			
Education (<10 years)			0.054		
			(0.071)		
Game*education (<10 years)			-0.044		
			(0.063)		
Income (<69,000 Pesos)				0.136***	
				(0.040)	
Game* income (<69,000 Pesos)				-0.126**	
				(0.061)	
Age (<40 years)					-0.112*
					(0.058)
Game*age (<40 years)					-0.040
					(0.063)
Intercept	0.158	0.111	0.077	0.027	0.411***
	(0.131)	(0.131)	(0.164)	(0.135)	(0.174)
	Panel B: Control variables				
Individual controls	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
	Panel C: Model				
Observations	1,033	1,033	1,033	1,033	1,033
R^2 adj.	0.031	0.036	0.030	0.046	0.034

Appendix I

Risk preferences elicitation

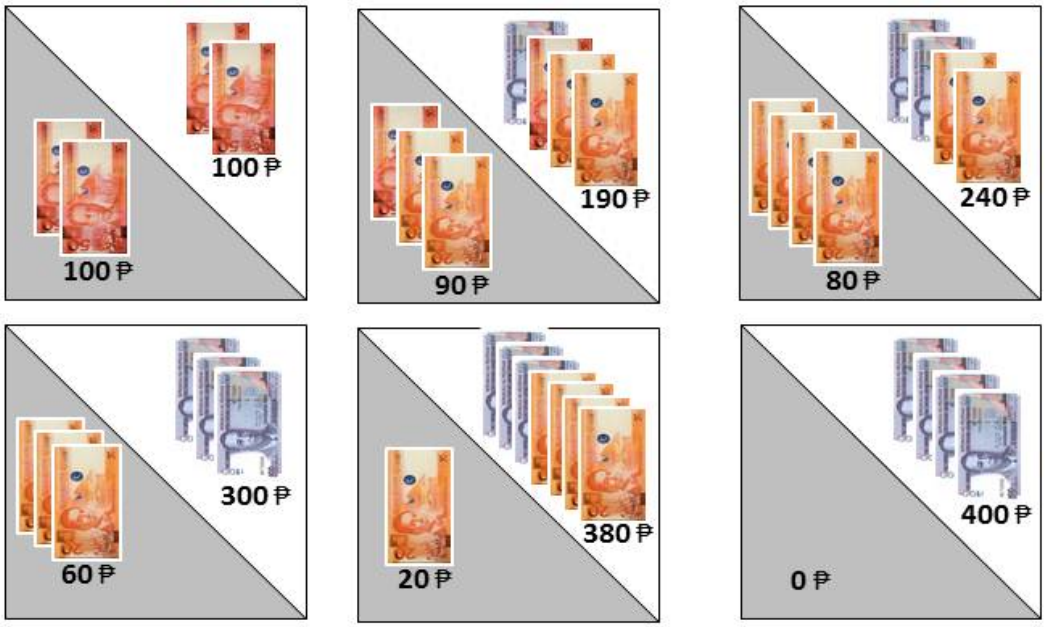


Figure 5.2: Binswanger (1980) lottery for eliciting risk preferences

Table 5.18: Binswanger (1980) lottery and estimated distribution of risk aversion

	Lottery characteristics			Parameter range of risk aversion ρ[a]	
Choice	High payoff (Pesos)	Low payoff (Pesos)	Expected value	Lower bound	Upper bound
1 (safe)	100	100	100	7.51	inf
2	190	90	140	1.74	7.51
3	240	80	160	0.81	1.74
4	300	60	180	0.32	0.81
5	380	20	200	0	0.32
6 (risky)	400	0	200	- inf	0

[a]Based on CRRA EU of the functional form $u(c) = (c^{1-\rho})/(1-\rho)$ with risk parameter $\rho > 0$ for risk-averse individuals.

Chapter 6

Experimental Protocols for Chapter 3

Our experiment was implemented both in a field laboratory setting in the Republic of the Philippines and in a computer laboratory setting in Germany. In general, the experimental procedures in the German computer laboratory setting exactly mimicked those implemented in the Philippine field laboratory with the main difference being the interaction with a computer terminal as opposed to an experimenter in the Philippine setting. Both experiments consisted of a pre-questionnaire, the self-protection game, and a post-questionnaire. Each participant was given a show-up fee of 50 Philippine Pesos (Philippines) or 4 Euros (Germany). The entire procedure lasted approximately 3 hours for the Philippine field laboratory setting and approximately 0.75 hours for the German computer laboratory setting. Participants were told that they could leave the game if they do not wish to participate. After the game rules have been explained, participants were asked a set of questions to test their understanding of the game. If a participant was unable to answer any of the test questions, the research assistants explained the rules again. If the participant was still unable to answer the test question, he or she was excluded from the game. The game was played with paper play money in the Philippine field laboratory setting and with a virtual laboratory currency named "Taler" in the German computer laboratory setting. The outcome of one game round to be paid out in addition to the show-up fee was determined randomly by either drawing a ball from a physical bag containing six balls numbered 1 to 6 (Philippines) or by the experimental software (Germany).

The presentation of game procedures is as follows. In Sections 6.1 to 6.3 we present instructions as well as detailed subject-experimenter interactions for the Philippine field laboratory setting for all control and treatment groups. Since the experiments were originally conducted in the local Hiligaynon language, we also present the English translations. Procedures for the experiments in Germany were slightly adapted to account for the computer laboratory environment. Detailed instructions and subject-experimenter interactions for the German computer laboratory setting are presented in Sections 6.4 to 6.5 both in the experiment language German and its English translation.

6.1 Procedures for control group C (Philippines)

Session instructions

English: *You have now received 300 Pesos. During the game you have the risk of losing 200 Pesos. Think of this as a daily life risk such as an accident or an illness. Suppose, for example, you are on your way to work and one day your motorcycle brakes do not work because they are old. You may lose some money because you cannot go to work the next day or you have to go to the mechanics and pay the repair bills. Another example could be that someone in your family gets sick. Here, you may lose some money because you have to take care of this person and cannot go to work or you have to take this person to the hospital and pay the medical bills. How much money do you have at the start of the game?*

These risks are represented in the game as orange balls. The way we determine your loss is by drawing balls from a bag. Here is bag number 1 with 4 orange balls and 6 white balls [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *We will ask you to draw one ball from this bag. If you draw an orange ball, you will lose 200 Pesos* [One assistant picks an orange ball from the bag and shows it to the participants]. *How many pesos do you lose if you draw an orange ball? How much money do you have left?*

In real life, drawing the orange ball is similar to having an accident or to get sick. What does the orange ball represent in daily life? However, we give you the chance to switch to another bag, bag number 2, with only 2 orange balls for a payment of 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *This means that if you pay 20 Pesos, the number of orange balls is reduced from 4 to 2. If you switch the bag, how much will you pay for the bag with 2 orange balls?*

You may think of switching the bags as being more careful in life, for example, to spend more money to have your work equipment in good condition so you are not hurt or have an accident. Another example could be to spend more money on healthy food and drinking water to not get sick. These changes cost money in real life so that in the game, this cost is reflected in the 20 Pesos you would pay for the bag with less orange balls. In the case you switch the bags, you will draw a ball from bag number 2 containing 2 orange balls and 8 white balls. Again, if you draw an orange ball, you lose 200 Pesos. If you draw a white ball, will you lose money?

This game will be played out three times. Let me explain the game a bit more along the lines of this poster [One assistant presents a printed poster as in Figure 6.1].

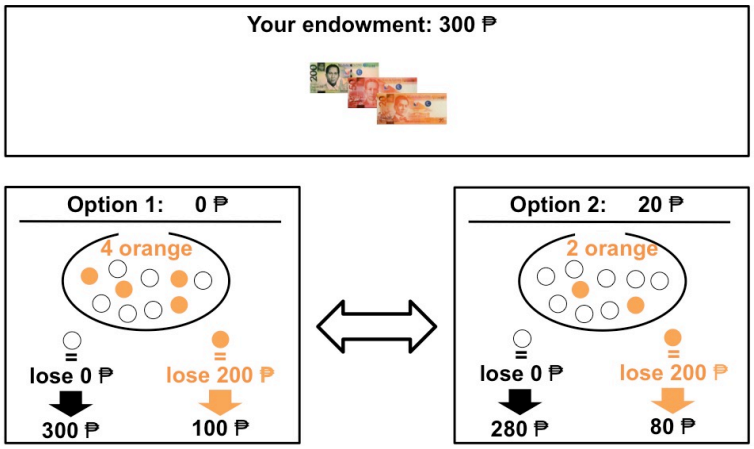


Figure 6.1: Poster to explain game in control round (English version)

Here you see the initial situation you are in. You have 300 Pesos available. You have the risk of losing 200 of your 300 Pesos. The risk of losing is represented by the orange balls in the bag. If you draw a white ball, you do not lose and your payout from this game is 300 Pesos. If you draw an orange ball you lose 200 Pesos and your payout from this game is 100 Pesos. You now have two options. One is to stay with the initial risk and bag number 1 with 4 orange balls and the other is to reduce the risk of losing 200 Pesos by switching to bag number 2 with only 2 orange balls. For that you would need to pay 20 Pesos. You can see the possible payouts for the two options here. Do you have any questions or are there things we should explain again?

The assistants will now call you by your player number. Please follow the assistant if you are called and remain seated in the mean time and do not talk to other players.

Hiligaynon: *Tanan kamo makabaton sang 300 Pesos. Samtang naga hampang ikaw may risgo nga ma pierde sang 200 Pesos. Ibutang naton nga pareho sang mga risgo nga gina-atubang naton sa matag-adlaw nga tanan pareho sang aksidente ukon balatian. Halimbawa, isa ka adlaw samtang ga pakadto ka sa ubra ang preno sang imo motor wala nag-gana kay daan na. Ikaw pwede ma pierde sang kwarta tungod kay indi ka ka obra sa dason nga adlaw ukon kinahanglan mo mag kadto sa mikaniko kag mag bayad sa pag pagkay-o. Isa pa nga pwede nga halimbawa, may nag masakit nga miembro sang imo pamilya. Sa diri, pwede ka mapierde sang kwarta tungod kay ki-*

nahanglan mo atipanon kag indi ka maka ubra ukon idal-on sya sa hospital kag mag bayad sang medical bills. Pila ang kwarta nga gina uyatan mo subong?

Ini nga mga risgo gina representar sang orange nga mga bola sa aton nga hampang. Ang pamaagi nga aton mahibaloan ang imo kapierdihan amo ang pag bunot sang bola sa bag. Ari ang bag number 1 nga may 4 ka orange nga bola kag 6 ka puti nga mga bola. [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Amon kamo gina pangabay nga mag bunot sang isa ka bola sa sini nga bag. Kung ikaw mkabunot sang orange nga bola ikaw mapierde sang 200 Pesos.* [One assistant picks an orange ball from the bag and shows it to the participants]. *Pila ka Pesos ang imo mapierde kung maka bunot ka sang orange nga bola? Pila bilin sang imo kwarta?*

Sa realidad ang pag bunot sang orange nga bola pareho man nga may aksidente ukon may nag masakit. Ano ang gina representar sang orange nga bola sa bag kung i-anggid sa tuod nga panga buhi? Ugaling kami magahatag sa imo sang chansa nga mag baylo sa lain nga bag, bag number 2 nga may 2 ka orange nga bola sa bayad nga 20 Pesos. [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Buot silingon kung mag bayad ka sang 20 Pesos, ang kadamuon sang orange nga bola maga nubo halin sa 4 pakadto sa 2. Kung mag baylo ka sang bag, pila ang imo ibayad para sa bag nga may 2 ka orange nga bola?*

Ikaw pwede maka pamensar nga ang pag baylo sang bag aton mapa anggid sa dugang nga pag halong sa aton kabuhi, halimbawa, ang pag gasto sang dako sa mga kagamitan sa trabaho para maayo ang kondisyon kag indi ikaw masakitan ukon ma-halitan, ukon maaksidente. Isa pa gid ka halimbawa amo ang pag gasto sang dako sa masustansya nga pagkaon kag tubig ilimnon para indi kita mag masakit. Ini nga mga pag baylo naga bili sang kwarta sa matuod nga pangabuhi amo man sa aton ham-pang, ini nga bili gina pakita sa 20 Pesos nga imo pagabayaran para sa bag nga may gamay nga orange nga bola. Inkaso mag baylo ka sang bag, ikaw maga bunot sang bola sa bag number 2 nga may unod 2 ka orange nga bola kag 8 ka puti nga bola. Sa liwat, kung ikaw makabunot sang orange nga bola, ikaw ma pierde sang 200 Pesos. Kung kamo maka bunot sang puti nga bola, may pierde bala kamo?

Ini nga hampang paga hampangon 3 ka beses. Ipa-athag ko pa gid ang ini nga ham-pang paagi sa sini nga poster [One assistant presents a printed poster as in Figure 6.1].

Diri imo makit-an kung diin ka nga sitwasyon subong. May ara ka nga 300 Pesos. May ara ka risgo nga ma pierde sang 200 Pesos gikan sa imo 300 Pesos. Ang risgo nga ikaw mapierde gina represintar sang orange nga bola sa bag. Kung ikaw maka bunot sang puti nga bola, wala ka sang pierde kag ang balayran sa imo sa sini nga hampang amo ang 300 Pesos. Kung ikaw maka bunot sang orange nga bola ikaw ma pierde sang 200 Pesos kag ang balayran sa imo sa sini nga hampang amo ang 100 Pesos. May duwa ka ka opsyon. Ang isa amo ang mag pabilin sa una nga risgo kag bag number 1 kung sa diin may ara 4 ka orange nga bola kag ang isa amo ang pag buhin sang risgo nga ma pierde sang 200 Pesos paagi sa pag baylo sa bag number 2 nga may ara lang 2 ka orange nga bola. Para dira kinahanglan mo mag bayad sang 20 Pesos. Diri mo makita ang possible nga balayran sa imo para sa duwa ka opsyon. May ara pa bala kamo nga mga pamangkot ukon may butang pa nga dapat ipa-athag liwat?

Ang mga assistant maga tawag sa inyo pamaagi sang inyo player number. Palihog sunod sa assistant kung kamo gin tawag kag mag pabilin nga maga pungko anay kag indi mag estorya sa iban nga manog hampang.

Subject-experimenter interactions

English: *We will now note your decision regarding the choice of bags. Which bag will you choose? Bag number 1 with 4 orange balls or bag number 2 with 2 orange balls for which you pay 20 Pesos?*

Procedures for control group contingent on participants' decisions

<table>
<tr><td></td><td colspan="4">Player decision</td></tr>
<tr><td></td><td colspan="2">2 orange balls</td><td colspan="2">4 orange balls</td></tr>
<tr><td>Assistant instruction</td><td colspan="2">Please pay 20 Pesos now.
[If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]</td><td colspan="2">[The assistant lets the player draw from the bag with 4 orange balls]</td></tr>
<tr><td>Result from draw</td><td>orange ball</td><td>white ball</td><td>orange ball</td><td>white ball</td></tr>
<tr><td>Assistant instruction</td><td>You have drawn an orange ball, which means that you have lost 200 Pesos. Your payout from this game is 80 Pesos. I have noted your result. Please hand your complete money over now.</td><td>You have drawn a white ball, which means that you have not lost money. Your payout from this game is 280 Pesos. I have noted your result. Please hand your complete money over now.</td><td>You have drawn an orange ball, which means that you have lost 200 Pesos. Your payout from this game is 100 Pesos. I have noted your result. Please hand your complete money over now.</td><td>You have drawn a white ball, which means that you have not lost money. Your payout from this game is 300 Pesos. I have noted your result. Please hand your complete money over now.</td></tr>
<tr><td colspan="5">[If another round of game is played]
Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.</td></tr>
</table>

Hiligaynon: *Amon paga sulaton ang imo desisyon parte sa gin pili mo nga bag. Diin nga bag ang imo paga pilion? Bag number 1 nga may 4 ka orange nga bola ukon bag number 2 nga may 2 ka orange nga bola kung sa diin maga bayad ka sang 20 Pesos?*

Procedures contingent on participants' decisions

<table>
<tr><td></td><td colspan="4">Player decision</td></tr>
<tr><td></td><td colspan="2">2 orange balls</td><td colspan="2">4 orange balls</td></tr>
<tr><td>Assistant instruction</td><td colspan="2">Palihog bayad sang 20 peso subong.
[If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]</td><td colspan="2">[The assistant lets the player draw from the bag with 4 orange balls]</td></tr>
<tr><td>Result from draw</td><td>orange ball</td><td>white ball</td><td>orange ball</td><td>white ball</td></tr>
<tr><td>Assistant instruction</td><td>Naka bunot ka sang orange nga bola buot silingon na pierde ka sang 200 Pesos. Ang balayran sa imo sa sini nga hamapang amo ang 80 Pesos. Akon na gin sulat ang imo resulta. Palihog hatag sang kumpleto nga kwarta subong.</td><td>Naka bunot ka sang puti nga bola buot silingon wala ka sang pierde nga kwarta. Ang balayran sa imo sa sini nga hampang amo ang 280 Pesos. Akun na gina sulat ang imo resulta. Palihog hatag sang kumpleto nga kwarta subong.</td><td>Naka bunot ka sang orange nga bola,buot silingon nga pierde ka sang 200 Pesos. Ang balayran sa imo sa sini nga hampang amo ang 100 Pesos. Akon na gina sulat ang imo resulta. Palihog hatag sang kumpleto nga kwarta subong.</td><td>Naka bunot ka sang puti nga bola bout silingon wala ka sang pierde nga kwarta. Ang balayran sa imo sa sini nga hampang amo ang 300 Pesos. Akon na gin sulat ang amo nga resulta. Palihog hatag sang kumpleto nga kwarta subong.</td></tr>
<tr><td colspan="5">[If another round of game is played]
Ari ang imo nga kwarta para sa sunod nga round. Palihog balik sa imo pulongkuan kag mag hulat asta nga matawag ka liwat. Palihog indi mag estorya o mag kumunikar sa iban nga manog hampang.</td></tr>
</table>

6.2 Procedures for individual insurance treatments I_{high} and I_{low} (Philippines) [1]

Session instructions

English: *This game consists of an insurance game. You have now received 220 Pesos, which is 80 Pesos less compared to the last game. However, you now have insurance. You must understand that the insurance is not for free but that you paid 80 Pesos for it. During the game you have the risk of losing 200 Pesos. As before, think of this as a daily life risk as it was presented in the two examples from the last game where your motorcycle brakes do not work because they are old and you have an accident or a family member gets sick. How much money do you have at the start of the game? How much does the insurance cost? How much will you lose if you draw an orange ball?*

[1] We have two different treatments for individual insurance, I_{high} and I_{low}, which differ in the level of deductible (I_{high} deductible = 40; I_{low} deductible = 100) and hence the premium (I_{high} premium = 80; I_{low} premium = 50). Hence the instructions for these two treatments are identical except for the numerical amount of the deductible and the premium. The instructions below are for I_{high}.

The insurance pays you 160 Pesos if and only if you have a loss. Without the insurance, you would have had to bear the full loss of 200 Pesos. With the insurance you would only have a loss of 40 Pesos. The way we determine your loss is the same as in the last game, where we draw balls from a bag. Here again is bag number 1 with 4 orange balls and 6 white balls [One assistant shows the bag and makes the number of orange and white balls visible to the participants].

We will again ask you to draw one ball from this bag. If you draw an orange ball, you will lose 200 Pesos, but your insurance pays you only 160 Pesos so your total loss is only 40 Pesos. How much would the insurance pay you if you draw the orange ball and you lose?

However, as in game 1, we give you the chance to switch to another bag, bag number 2, with only 2 orange balls for a payment of 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *This means that if you pay 20 Pesos, the number of orange balls is reduced from 4 to 2. If you switch the bag, how much will you pay for the bag with 2 orange balls?*

As in the last game, you may think of switching the bags as being more careful in life, for example, to spend more money to have your work equipment in good condition so you are not hurt or have an accident. Another example could be to spend more money on healthy food and drinking water to not get sick. Again, these changes cost money in real life so that in the game, this cost is reflected in the 20 Pesos you would pay for the bag with less orange balls. In the case you switch to bag number 2, you will draw a ball from the bag containing 2 orange balls and 8 white balls. Again, if you draw an orange ball, you will lose 200 Pesos, but your insurance pays you 160 Pesos so your total loss is only 40 Pesos. This game will be played out three times. Let me explain the game a bit more along the lines of this poster [One assistant presents a printed poster as in Figure 6.2].

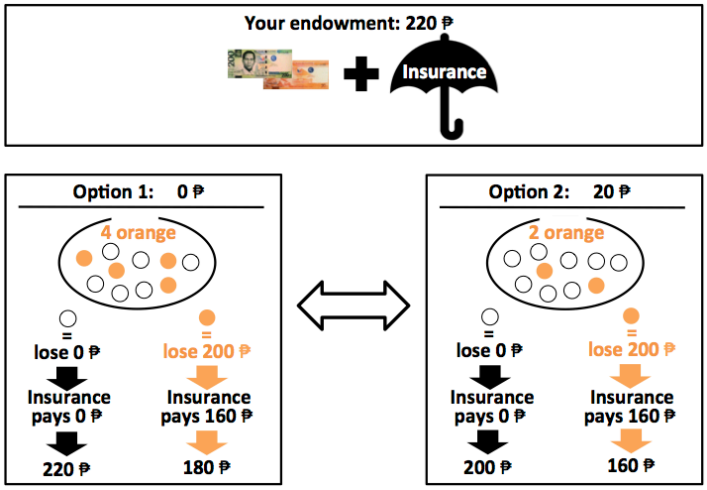


Figure 6.2: Poster to explain game in individual insurance round (English version)

Here you see the initial situation you are in. You have 220 Pesos available and you are insured. You have the risk of losing 200 of your 220 Pesos. The risk of losing is represented by the orange balls in the bag. What does the orange ball represent in daily life? In case you choose bag number 1, if you draw a white ball, you do not lose and your payout from this game is 220 Pesos. If you draw a white ball, will you lose? Will the insurance pay you when you have no loss? If you draw an orange ball, you lose 200 Pesos; however, your insurance pays you 160 Pesos. So your loss is only 40 Pesos and your payout from this game is 180 Pesos. You now have another option, which is to reduce the risk of losing 200 Pesos by switching to bag number 2 with only 2 orange balls. For that you would need to pay 20 Pesos. In both cases the insurance pays you 160 Pesos if you have a loss. You can see the possible payouts for the two options here. Do you have any questions or are there things we should explain again?

The assistants will now call you by your player number. Please follow the assistant if you are called and remain seated in the mean time and do not talk to other players.

***Hiligaynon:** Ini nga hampang gina lakipan sang insurance game. Ikaw subong maka baton sang 220 Pesos, kung sa diin manubo sang 80 Pesos kumparar sa ulihi nga hampang. Ugaling, subong may ara ka nga insurance. Dapat mo ma intindihan nga ang insurance indi libre pero nag bayad ka sang 80 Pesos para dira. Samtang naga hampang may risgo nga ma pierde ka sang 200 Pesos. Pareho sang nag ligad, aton ipaangid ini sa matag adlaw nga risgo sa aton kabuhi pareho sa gin presintar nga duwa ka halimbawa sa ulihi nga hampang kung sa diin ang preno sang imo motor wala nag-gana kay daan na kag ikaw na aksidente ukon ang miembro sang imo pami-*

lya nag masakit. Pila ang kwarta nga gina uyatan mo subong? Pila ang bili sang insurance? Pila ang imo pierde kung ikaw maka bunot sang orange nga bola?

Ang insurance maga bayad sa imo sang 160 Pesos lamang kung ikaw may ka pierdihan. Kung wala insurance, ikaw ang maga salo sang bog-os nga ka pierdihan sa kantidad nga 200 Pesos. Kung may insurance ikaw may kapierdihan nga 40 Pesos lang. Pila ang tabunan sang insurance kung ikaw maka bunot sang orange nga bola ukon kung ikaw ma pierde? Ang pamaagi namon sa paghibalo sang imo ka pierdihan pareho lang sang nag ligad nga hampang, kung sa diin kita mabunot sang bola sa bag. Diri sa liwat may bag number 1 nga may 4 ka orange nga bola kag 6 ka puti nga bola [One assistant shows the bag and makes the number of orange and white balls visible to the participants].

Kami maga hinyo liwat sa imo nga mag bunot sang isa ka bola sa sini nga bag. Kung ikaw maka bunot sang orange nga bola, ikaw ma pierde sang 200 Pesos, ugaling ang imo insurance maga bayad lang sa imo sang 160 Pesos tungod sina ang kabilogan mo nga pierde amo ang 40 Pesos lamang.

Ugaling, pareho sa game 1, kami maga hatag sa imo sang chansa nga mag baylo sa lain nga bag, bag number 2 nga may ara lang nga 2 ka orange nga bola sa bayad nga 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Buot silingon kung ikaw mag bayad 20 Pesos, ang kadamuon sang orange nga bola maga nubo halin sa 4 pakadto sa 2. Kung mag baylo ka sang bag, pila ang imo ibayad para sa bag nga may 2 ka orange nga bola?*

Pareho sang ulihi nga hampang, ang pag baylo sang bag aton ma- anggid sa dugang nga pag halong sa aton kabuhi, halimbawa ang pag gasto sang dako sa mga kagamitan sa trabaho para maayo ang kondisyon kag indi ikaw masakitan ukon mahalitan ukon maaksidente. Isa pagid ka halimbawa amo ang pag gasto sang dako sa masustansya nga pagkaon kag tubig ilimnon para indi kita mag masakit. Sa liwat ini nga mga pag baylo naga bili sang kwarta sa matuod nga pangabuhi amo man sa aton hampang, ini nga bili gina pakita sa 20 Pesos nga imo pagabayaran para sa bag nga may gamay nga orange nga bola. Inkaso mag baylo ka sa bag number 2, ikaw maga bunot sa bag nga may unod 2 ka orange nga bola kag 8 ka puti nga bola. Sa liwat kung ikaw makabunot sang orange nga bola ikaw ma pierde sang 200 Pesos, ugaling ang imo insurance maga bayad sa imo sang 160 Pesos ano pa ang imo kabilogan nga pierde amo lamang ang 40 Pesos. Ini nga hampang paga hampangon sang 3 ka beses.

Ipa-athag ko pa gid ang ini nga hampang paagi sa sini nga poster [One assistant presents a printed poster as in Figure 6.2].

Diri imo makit-an kung diin ka nga sitwasyon subong. May ara ka na uyatan 220 Pesos kag ikaw insured na. May ara ka risgo nga ma pierde sang 200 Pesos gikan sa 220 Pesos mo. Ang risgo nga ikaw mapierde gina represintar sang orange nga bola sa bag. Ano ang gina representar sang orange nga bola sa bag kung i-anggid sa tuod nga panga buhi? Inkaso pilion mo ang bag number 1, kung ikaw maka bunot sang puti nga bola, wala ka sang pierde kag ang balayran sa imo sa sini nga hampang amo ang 220 Pesos. Kung maka bunot ka sang puti nga bola, may pierde ka bala? Ukon may balayran ang insurance sa imo? Kung ikaw maka bunot sang orange nga bola, ikaw ma pierde sang 200 Pesos; ugaling ang imo insurance maga bayad sa imo sang 160 Pesos. Bale ang imo pierde amo ang 40 Pesos lamang kag ang balayran sa imo sa sini nga hampang amo ang 180 Pesos. May ara ka lain nga opsyon, ini ang pagpanubo sang risgo nga ma pierde sang 200 Pesos paagi sa pag baylo sa bag number 2 nga may ara lamang 2 ka orange nga bola. Para dira kinahanglan mo mag bayad sang 20 Pesos. Sa duwa ka sitwasyon ang insurance maga bayad sa imo sang 160 Pesos kung ikaw may ka pierdihan. Diri mo makita ang possible nga balayran sa imo para sa duwa ka opsyon. May ara pa bala kamo nga mga pamangkot ukon may butang pa nga dapat ipa-athag liwat?

Ang mga assistants maga tawag sa inyo pamaagi sang inyo player number. Palihog sunod sa assistant kung kamo gin tawag kag mag pabilin nga naga pungko anay kag indi mag estorya sa iban nga manog hampang.

Subject-experimenter interactions

English: *We will now note your decision regarding the choice of bags. Which bag will you choose knowing that you have insurance? Bag number 1 with 4 orange balls or bag number 2 with orange balls for which you have to pay 20 Pesos?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 160 Pesos to you. Your payout from this round is 160 Pesos. I have noted your resul. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 200 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 160 Pesos to you. Your payout from this round is 180 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 220 Pesos. I have noted your result. Please hand your complete money over now.*
[If another round of game is played] *Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

Hiligaynon: *Amon paga sulaton ang imo desisyon parte sa bag nga imo gin pili. Diin nga bag ang imo paga pilion kung bal-an mo nga may ara ka insurance? Bag number 1 nga may 4 ka orange nga bola ukon Bag number 2 nga may 2 ka orange nga bola kung sa diin maga bayad ka sang 20 Pesos?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Palihog bayad sang 20 peso subong.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nga bola buot silingon na pierde ka sang 200 Pesos. Ugaling ang imo insurance maga bayad 160 Pesos sa imo. Ang balayran sa imo sa sini nga round amo ang 160 Pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde nga kwarta. Ang balayran sa imo sa sini nga round amo ang 200 Pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang kumpleto nga kwarta subong.*	*Naka bunot ka sang orange nga bola buot silingon na pierde ka sang 200 Pesos. Ugaling ang imo insurance maga bayad 160 Pesos sa imo. Ang balayran sa imo sa sini nga round amo ang 180 Pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde nga kwarta. Ang balayran sa imo sa sini nga round amo ang 220 Pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang kumpleto nga kwarta subong.*
[If another round of game is played] *Ari ang imo nga kwarta para sa sunod nga round. Palihog balik sa imo pulongkuan kag mag hulat asta nga matawag ka liwat. Palihog indi mag estorya o mag kumunikar sa iban nga manog hampang.*				

6.3 Procedures for group insurance treatments $G_{private}$ and G_{public} (Philippines) [2]

Session instructions

English: *This game consists of an insurance game. You now receive 250 Pesos, which is 50 Pesos less compared to the last game. However, you now have insurance. You must understand that the insurance is not for free but that you paid 50 Pesos for it. During the game you have the risk of losing 200 Pesos. As before, think of this as a daily life risk as it was presented in the two examples from the last game where your motorcycle brakes do not work because they are old and you have an accident or a family member gets sick. How much money do you have at the start of the game? How much does the insurance cost? How much will you lose if you draw an orange ball? The insurance pays you 100 Pesos if and only if you have a loss. Without the insurance, you would have had to bear the full loss of 200 Pesos. With the insurance you would only have a loss of 100 Pesos. How much would the insurance pay you if you draw the orange ball and you lose?*

Another feature of the insurance contract is that you are insured together with your game partner. Your game partner is the person with the same group number on his/her nametag. To show you who your game partner is, we will now call the group numbers and ask you stand up when your group number is called [One assistant calls the group numbers one by one and asks the players to stand up to see each other]. *We explained that the insurance will only pay you 100 Pesos when you have a loss of 200 Pesos. The important aspect to understand with this group insurance is that you have to share the loss of 100 Pesos that the insurance does not pay amongst each other. This means that if you have a loss and your partner does not, he/she will pay you 50 Pesos. The same happens if your partner has a loss and you do not. In that case, you pay 50 Pesos to your partner. If both of you have losses or neither of you have a loss, no money is exchanged. To sum up, the loss of any one of you in your group affects the loss of the other.*

The way we determine your loss is the same as in the last game, where we draw balls from a bag. Here again is bag number 1 with 4 orange balls and 6 white balls [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *We will again ask you to draw one ball from this bag. If you draw an*

[2] We have two different treatments for group insurance, $G_{private}$ and G_{public}, which differ in whether self-protection is observable (G_{public}) or not ($G_{private}$), requiring slight variations of the instrucitons. In $G_{private}$, we let the participants know that their self-protection decision is private wheras in G_{public}, we let them know that their self-protection decision will be made available to their partner. The following instruction is for G_{public} where the instruction that differs from $G_{private}$ is underlined.

orange ball, you will lose 200 Pesos, but your insurance pays you only 100 Pesos. In addition your partner pays you 50 Pesos if he/she does not have a loss on his/her own. Remember also that if you do not have a loss and your partner does, you will have to pay 50 Pesos to him/her. How much would your game partner pay you, if he/she did not lose and if you draw the orange ball?

However, as in game 1, we give you the chance to switch to another bag, bag number 2, with only 2 orange balls for payment of 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *This means that if you pay 20 Pesos, the number of orange balls is reduced from 4 to 2. If you switch the bag with 2 orange balls, how much is the cost of the bag with 2 orange balls? As in the last game, you may think of switching the bags as being more careful in life, for example, to spend more money to have your work equipment in good condition so you are not hurt or have an accident. Another example could be to spend more money on healthy food and drinking water to not get sick.*

It is important for you to know that your game partner will know your decision regarding the choice of bags. This means that after you and your game partner made your decisions and have drawn from the bag, your partner will be told about your choice of bags and you will be told the choice of bags of your partner. Would your game partner know regarding your choice of bag? In the case you switch the bags, you will draw a ball from the bag containing 2 orange balls and 8 white balls. Again, if you draw an orange ball, you will lose 200 Pesos, but your insurance pays you only 100 Pesos and the remaining loss of 100 Pesos will be shared between you and your partner if only one of you two has a loss. Remember that your game partner has the same choice as you do.

Let me explain the game a bit more along the lines of this poster [One assistant presents a printed poster as in Figure 6.3].

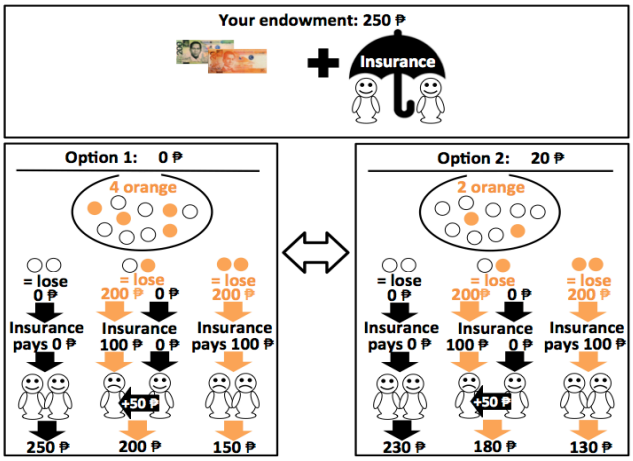


Figure 6.3: Poster to explain game in group insurance round (English version)

Here you see the initial situation you are in. You have 250 Pesos available and you are insured together with your game partner. You and your partner both have the risk of losing 200 of your 250 Pesos. The risk of losing is represented by the orange balls in the bag. What does the orange ball represent in your daily life? Let us consider the case when you choose bag number 1. If you draw a white ball, you do not lose. However, if your partner has a loss, you will have to pay 50 Pesos to him/her. Your payout from this game then is 200 Pesos. If you both do not have losses, your payout is 250 Pesos. If you draw a white ball, will you lose? How much will the insurance pay you if you do not lose? If you draw an orange ball, you lose 200 Pesos; however, your insurance pays you 100 Pesos. So your loss is only 100 Pesos. If then your game partner does not have a loss on his/her own, then he/she has to pay 50 Pesos to you and your payout from the game is 200 Pesos. If you both have losses, no money is exchanged between the two of you and your payout from this game is 150 Pesos. Let us now consider the case when you choose to reduce the risk of losing 200 Pesos by switching to bag number 2 with only 2 orange balls. For that you would need to pay 20 Pesos. In both cases the insurance pays you 100 Pesos and the 100 Pesos not paid by the insurance is shared between you and your game partner if only one of you has a loss. You can see the possible payouts for the two options here. Remember that your partner will learn which of the two bags you pick. Do you have any questions or are there things we should explain again?

The assistants will now call you by your player number. Please follow the assistant if you are called and remain seated in the mean time and do not talk to other players.

***Hiligaynon:** Ini nga hampang gina lakipan sang insurance game. Ikaw subong maka baton sang 250 Pesos, kung sa diin manubo sang 50 Pesos kumparar sa ulihi nga*

hampang. Ugaling, subong may ara ka nga insurance. Imo dapat nga ma intindihan nga ang insurance indi libre kundi imo ginbayaran sang 50 Pesos para dira. Samtang naga hampang may risgo nga ma pierde ka sang 200 Pesos. Pareho sang nag ligad, aton ipaangid ini sa matag adlaw nga risgo sa aton kabuhi pareho sa gin presintar nga duwa ka halimbawa sa ulihi nga hampang kung sa diin ang preno sang imo motor wala nag-gana kay daan na kag ikaw na aksidente ukon ang miembro sang imo pamilya nag masakit. Pila ang kwarta nga gina uyatan mo subong? Pila ang bili sang insurance? Pila ang imo pierde kung ikaw maka bunot sang orange nga bola? Ang insurance maga bayad sa imo sang 100 Pesos lamang kung ikaw may ka pierdihan. Kung wala insurance, ikaw ang maga salo sang bug-os nga ka pierdihan sa kantidad nga 200 Pesos. Kung may insurance ikaw may kapierdihan nga 100 Pesos lang. Pila ang tabunan sang insurance kung ikaw maka bunot sang orange nga bola ukon kung ikaw ma pierde?

Ang isa pa ka bagay nga na lakip sa kontrata sang insurance amo nga ikaw kag ang imo game partner pareho nga insured. Ang imo game partner amo ang tawo nga may pareho kamo nga group number sa iya nga name tag. Para ipakita sa imo kung sin-o ang imo game partner, amon paga lawagon ang group number kag amon gina pangabay nga mag tindog kamo kung ang imo group number gin lawag [One assistant calls the group numbers one by one and asks the players to stand up to see each other]. *Gin eksplikar na namon nga ang insurance maga bayad lamang sa imo sang 100 Pesos kung ikaw may pierde nga 200 Pesos. Ang importante nga aspeto nga dapat intiendihon sa sini nga group insurance amo nga ikaw maga tunga sa kapierdihan nga 100 Pesos nga indi pag bayaran sang insurance sa inyo. Buot silingon kung ikaw may pierde kag imo partner wala, sya maga bayad sa imo 50 Pesos. Amo man ang matabo kung ang imo partner may pierde kag ikaw wala. Sa ina nga kaso, ikaw maga bayad sang 50 Pesos sa imo partner. Kung duha kamo may kapierdihan ukon wala sang isa sa inyo ang na pierde, wala baylohanay sang kwarta nga matabo. Suma total, ang kapierdihan sang isa sa inyo grupo maka apekto sa kapierdihan sang iban.*

Ang pamaagi namon sa paghibalo sang imo ulihi nga ka pierdihan pareho lang sang nag ligad nga hampang, kung sa diin kita mabunot sang bola sa bag. Ari sa liwat ang bag number 1 nga may 4 ka orange nga bola kag 6 ka puti nga bola [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Kami maga hinyo liwat sa imo nga mag bunot sang isa ka bola sa sini nga bag. Kung ikaw maka bunot sang orange nga bola, ikaw ma pierde sang 200 Pesos, apang ang imo insurance maga bayad lang sa imo sang 100 Pesos. Dugang pa ang imo partner ma bayad sa imo 50 Pesos kun sya wala sang kaugalingon nga kapierdihan.*

Dumdumon man nga kung ikaw wala sang kapierdihan kag ang partner mo may ara, kinahanglan mo man mag bayad sang 50 Pesos sa iya. Pila ang ibayad sang imo game partner sa imo, kung ikaw naka bunot sang orange nga bola kag sya wala na pierde?

Ugaling, pareho sa game 1, kami maga hatag sa imo sang chansa nga mag baylo sa lain nga bag, bag number 2, nga may unod nga 2 ka orange nga bola sa bayad nga 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Buot silingon kung ikaw mag bayad 20 Pesos, ang kadamuon sang orange nga bola maga nubo halin sa 4 pakadto sa 2. Kung mag baylo ka sang bag, pila ang imo ibayad para sa bag nga may 2 ka orange nga bola? Pareho sang ulihi nga hampang, ang pag baylo sang bag aton ma- anggid sa dugang nga pag halong sa aton kabuhi, halimbawa, ang pag gasto sang dako sa mga kagamitan sa trabaho para maayo ang kondisyon kag indi ikaw masakitan ukon mahalitan ukon maaksidente. Isa pagid ka halimbawa amo ang pag gasto sang dako sa masustansya nga pagkaon kag tubig ilimnon para indi kita mag masakit.*

Importante nga ma bal-an mo nga ang imo partner sa hampang makahibalo sang imo disisyon parte sa gin pili mo nga bag. Buot silingon pagkatapos mo kag sang imo game partner himo sang desisyon kag naka bunot sa bag, ang imo partner paga sugidan parte sa bag nga imo gin pili kag ikaw paga sugidan man parte sa bag nga gin pili sang imo nga partner. Makahibalo bala ang imo game partner parte sa bag nga imo gin pili? Inkaso mag baylo ka sang bag, ikaw maga bunot sa bag nga may 2 ka orange nga bola kag 8 ka puti nga bola. Sa liwat, kung ikaw makabunot sang orange nga bola, ikaw ma pierde sang 200 Pesos, apang ang imo insurance maga bayad lang sa imo sang 100 Pesos kag ang nabilin nga 100 Pesos pagatungaon sa imo kag sa imo partner kung ang isa sa inyo may kapierdihan. Dumduma nga ang imo partner sa hampang may pareho man nga chansa sa pag pili pareho sa imo.

Ipa-athag ko pa gid kung paano ang hampang pama-agi sa sini nga poster [One assistant presents a printed poster as in Figure 6.3].

Diri imo makita ang inisyal nga sitwasyon kung sa diin ka subong. Ikaw may ara 250 Pesos nga gina uyatan kag ikaw na insured ka-upod sang imo nga game partner. Ikaw kag ang imo partner may risgo nga mapierde sang 200 Pesos sang inyo nga 250 Pesos. Ang risgo nga mapierde gina represintar sang orange nga bola sa sulod sang bag. Ano ang gina representar sang orange nga bola sa bag kung i-anggid sa tuod nga panga buhi? Aton konsiderahon sa kaso nag pilion mo ang bag number 1. Kung

ikaw maka bunot sang puti nga bola, wala ikaw sang pierde. Ugaling, kung ang imo partner may pierde, ikaw maga bayad sang 50 Pesos sa iya. Ang balayran sa imo sa sini nga hampang amo ang 200 Pesos. Kung kamo nga duha wala sang pierde, ang balayran sa inyo amo ang 250 Pesos. Kung maka bunot ka sang puti nga bola, may pierde ka bala? Ukon may balayran ang insurance sa imo? Kung ikaw maka bunot sang orange nga bola, ikaw ma pierde sang 200 Pesos; ugaling, ang imo insurance maga bayad sa imo sang 100 Pesos. Ang imo nga pierde 100 Pesos lamang. Kung ang imo partner sa hampang wala sang kaugalingon nga pierde, sya maga bayad sang 50 Pesos sa imo kag ang imo mabilin nga kwarta amo ang 200 Pesos. Kung kamo nga duha may kapierdihan, wala sang pag baylohanay sang kwarta nga matabo kag ang balayran sa imo sa sini nga hampang amo ang 150 Pesos. Aton subong konsiderahon sa kaso nga pilion mo nga panubu-on ang risgo nga mapierde sang 200 Pesos paagi sa pag baylo sa bag number 2 nga may ara lang 2 ka orange nga bola. Para sa ina kinahanglan mo mag bayad sang 20 Pesos. Sa duha ka kaso ang insurance maga bayad sang 100 Pesos kag ang 100 Pesos nga wala gin bayaran sang insurance paga tungaon mo kag sang imo game partner kung isa lang sa inyo may pierde. Diri mo makita ang posible nga balayran sa duha ka opsyon. Dumduma nga ang imo partner makahibalo parte sa bag nga imo gin pili. May ara pa bala kamo nga mga pamangkot ukon may butang pa nga dapat ipa-athag liwat?

Ang mga assistant maga tawag sa inyo pamaagi sang inyo player number. Palihog sunod sa assistant kung kamo gin tawag kag mag pabilin nga naga pungko anay kag indi mag estorya sa iban nga manog hampang.

Subject-experimenter interactions

English: *Which bag do you think your game partner will choose? The one with 2 orange balls or the one with 4 orange balls? We will now note your decision regarding the choice of bags. Which bag will you choose knowing that you have the insurance together with your game partner? The one with 2 orange balls for which you pay 20 Pesos or the initial one with 4 orange balls?*

Procedures contingent on participants' decisions

	Player decision	
	2 orange balls	**4 orange balls**
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]	[The assistant lets the player draw from the bag with 4 orange balls]
Result from draw	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 100 Pesos to you. Please hand the 100 Pesos loss not paid by the insurance to me. The total payout from this game can only be determined after we have taken the decisions from all game participants and is dependent on your game partners' outcome. Please keep your remaining money, go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*	*You have drawn a white ball, which means that you have not lost money. The total payout from this game can only be determined after we have taken the decisions from all game participants and is dependent on your game partners' outcome. Please keep your remaining money, go back to your seat and wait until you are called in again. Please do not talk or communicate with other players."*

[After everyone has made the decision and drawn from one of the bags, one assistant calls the players again individually by player number.]

Procedures contingent on participants' results and the result of the game partner

	Player result			
	orange ball		**white ball**	
Result for Game partner	**orange ball**	**white ball**	**orange ball**	**white ball**
Assistant instruction	*As you remember, you had a loss of 200 Pesos of which 100 Pesos were paid by the insurance. Unfortunately your partner also experienced a loss, which is why he/she cannot pay you the 50 Pesos. Your payout from this round is 130 Pesos (if switched bags)/150 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had a loss of 200 Pesos of which 100 Pesos were paid by the insurance. Fortunately your partner has not experienced a loss, which is why he/she can pay you the 50 Pesos. Your result of this round now is 180 Pesos (if switched bags)/200 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had no loss. Unfortunately your partner has experienced a loss, which is why you have to pay the 50 Pesos to your partner. Your result of this round now is 180 Pesos (if switched bags)/200 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had no loss. Fortunately your partner also has not experienced a loss, which is why you don't have to pay 50 Pesos to your partner. Your result of this round now is 230 Pesos (if switched bags)/250 Pesos (else). I have noted your result. Please hand your complete money over now.*
[An assistant lets the player know about his/her game partners' bag choice.]				
[If another round of game is played] *Here is your endowment of 240 Pesos for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

Hiligaynon: *Diin sa pamatyag mo ang bag nga paga pilion sang imo game partner? Ang isa nga may 2 ka orange nga bola ukon ang isa nga may 4 ka orange nga bola? Amon paga sulaton ang imo desisyon parte sa bag nga imo gin pili. Diin nga bag ang imo paga pilion kung bal-an mo nga may ara ka insurance kaupod ang imo game partner? Ang isa nga may 2 ka orange nga bola kung sa diin maga bayad ka sang 20 Pesos ukon ang nauna nga may 4 ka orange nga bola?*

Procedures contingent on participants' decisions

	Player decision	
	2 orange balls	**4 orange balls**
Assistant instruction	*Palihog bayad sang 20 Pesos subong.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]	[The assistant lets the player draw from the bag with 4 orange balls]
Result from draw	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nag bola buot silingon na pierde ka sang 200 Pesos. Apang ang imo insurance maga bayad sa imo sang 100 Pesos. Palihog hatag sa akon sang 100 Pesos nga pierde nga indi pag bayaran sang insurance. Ang kabilogan nga balayran sa imo sa sini nga hampang mahibaloan lang pag katapos namon kuha ang disisyon sang tanan nga manog hampang kag naga depende sa resulta sa hampang sang imo game partner. Palihog tago sang nabilin nga kwarta, balik sa imo pulongkuan kag mag hulat asta lawagon ka liwat. Palihog indi mag istorya ukon mag kumunikar sa iban nga manog hampang.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde. Ang balayran sa imo sa sini nga hampang mahibaloan lamang pag katapos namon kuha sang desisyon sang tanan nga manog hampang kag naga depende sa resulta sang imo game partner. Palihog tago sang nabilin nga kwarta, balik sa imo pulongkuan kag mag hulat asta lawagon ka liwat. Palihog indi mag istorya ukon mag kumunikar sa iban nga manog hampang.*

[After everyone has made the decision and drawn from one of the bags, one assistant calls the players again individually by player number.]

Procedures contingent on participants' results and the result of the game partner

	Player Result			
	orange ball		**white ball**	
Result for game partner	**orange ball**	**white ball**	**orange**	**white ball**
Assistant instruction	*Sa imo nadumduman, napierde ka sang 200 Pesos sa diin 100 Pesos ang bayaran sang insurance. Ugaling sa kadimalason ang imo nga partner na pierde man, sa diin indi sya maka bayad sa imo sang 50 Pesos. Ang balayran sa imo sa sini nga round amo ang 130 Pesos (if switched the bags) /150 Pesos (else). Akon na gin sulat ang resulta sang imo hampang. Palihog balik sang tanan ukon kompleto nga kwarta subong.*	Sa imo na dumduman, pierde ka sang 200 Pesos *sa diin 100 Pesos ang bayaran sang insurance. Maayo lang* ang imo nga partner wala na pierde, amo nga maka bayad sya sa imo sang 50 Pesos. Ang balayran sa imo sa sini nga round amo ang 180 Pesos *(if switched the bags) /200 Pesos (else). Akon na gin sulat ang resulta sang imo hampang. Palihog balik sang tanan ukon kompleto nga kwarta subong.*	Sa imo na dumduman, wala ka pierde. *Ugaling sa kadimalason ang imo nga partner na pierde, sa diin kinahanglan mo mag bayad sang 50 Pesos sa imo nga partner. Ang balayran sa imo sa sini nga round amo ang 180 Pesos (if switched the bags)/200 Pesos (else). Akon na gin sulat ang resulta sang imo hampang. Palihog balik sang tanan ukon kompleto nga kwarta subong.*	Sa imo na dumduman, wala ka pierde. Mayo lang ang imo nga partner wala man na pierde, sa diin indi na kinahanglan pa nga mag bayad sang 50 peso sa imo partner. *Ang balayran sa imo sa sini nga round amo ang 230 Pesos (if switched the bags)/250 Pesos (else). Akon na gin sulat ang resulta sang imo hampang. Palihog balik sang tanan ukon kompleto nga kwarta subong.*
[An assistant lets the player know about his/her game partners' bag choice.]				
[If another round of game is played] *Ari ang imo bag-o nga kwarta para sa sunod nga round. Palihog balik sa imo pulongkuan kag mag hulat asta nga matawag ka liwat. Palihog indi mag estorya o mag kumunikar sa iban nga manog hampang.*				

6.4 Procedures for control group C (Germany)

Session instructions

English: *Your initial capital is 300 Taler. During the game you have the risk of losing 200 Taler. Think of this as a daily life risk such as an accident. Suppose, for example, you are on campus and your bicycle is. Further examples could be damage to your mobile phone or damage to your car.*

These risks are represented in the game as orange balls. The way we determine your loss is by randomly a drawing a ball from a bag. Here you see a bag with 4 orange balls and 6 white balls [A bag with the respective number of orange and white balls is displayed on the screen]. *One ball will randomly be drawn from this bag. If you draw an orange ball, you will lose 200 Taler.*

However, we give you the chance to switch to another bag with only 2 orange balls for a payment of 20 Taler [A bag with the respective number of orange and white balls is displayed on the screen]. *This means that if you pay 20 Taler, the number of orange balls is reduced from 4 to 2.*

You may think of switching the bags as being more careful in life, for example, to spend money on a good lock for your bicycle, buy a wrapper for your mobile phone or just be more careful, e.g., through careful driving. More careful behaviour is costly in real life so that in the game, the 20 Taler reflect the cost you would pay for the bag with less orange balls. In the case you switch the bags, we will randomly draw a ball from the second bag containing 2 orange balls and 8 white balls. Again, if you draw an orange ball, you lose 200 Taler.

In the following, we provide a graphical illustration of the game [Figure 6.1 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

You have 300 Taler available. You have the risk of losing 200 of your 300 Taler. The risk of losing is represented by the orange balls in the bag. In case you choose the initial bag with 4 orange balls and if a white ball is drawn, you do not lose and your payout from this game is 300 Taler. If an orange ball is drawn you lose 200 Taler and your payout from this game is 100 Taler. You now have two options. One is to stay with the initial risk and bag with 4 orange balls and the other is to reduce the risk of losing 200 Taler by switching to the bag with only 2 orange balls. For that you would need to pay 20 Taler. You can see the possible payouts for the two options here.

Do you have any questions or are there things we should explain again?

German.– Ihr Startkapital beträgt 300 Taler. Während des Spiels haben Sie das Risiko, 200 Taler zu verlieren. Stellen Sie sich dies als ein alltägliches Lebensrisiko wie einen Unfall vor. Nehmen Sie zum Beispiel an, dass Sie auf dem Campus sind und Ihr Fahrrad gestohlen wird. Weitere Beispiele könnten sein, dass Sie Ihr Handy beschädigen oder dass Sie einen Unfall mit Ihrem Auto haben.

Diese Risiken werden im dem Spiel als orangene Bälle dargestellt. Das Verfahren, mit dem wir Ihren Verlust bestimmen, ist das zufällige Ziehen eines Balles aus einer Urne. Hier sehen Sie eine Urne mit 4 orangenen und 6 weißen Ballen [A bag with the respective number of orange and white balls is displayed on the screen]. *Ein Ball wird zufällig aus dieser Urne gezogen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie 200 Taler.*

Wir werden Ihnen aber die Möglichkeit geben, zu einer anderen Urne mit nur 2 orangenen Bällen für eine Zahlung von 20 Talern zu wechseln Taler [A bag with the respective number of orange and white balls is displayed on the screen]. *Dies bedeutet, dass, wenn Sie 20 Taler zahlen, die Anzahl orangener Bälle von 4 auf 2 reduziert wird.*

Sie können sich das Wechseln der Urnen als vorsichtigeres Verhalten vorstellen, indem Sie zum Beispiel Geld für ein gutes Fahrradschloss ausgeben, eine Hülle für Ihre Handy kaufen oder einfach vorsichtiger handeln, z.B. durch umsichtiges Fahren. Vorsichtigeres Verhalten hat im wirklichen Leben einen Preis. Diese Kosten werden im Spiel durch die 20 Taler reflektiert, die Sie für die Urne mit weniger orangenen Bällen zahlen müssen. Im Fall, dass Sie die Urnen wechseln, werden wir zufällig einen Ball aus der zweiten Urne, der mit 2 orangenen und 8 weißen Bälle, ziehen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie wiederum 200 Taler.

Sie werden dieses Spiel über drei Runden spielen. Zu Beginn jeder Runde werden Sie das gleiche Startkapital von 300 Talern erhalten. Im Folgenden finden Sie eine graphische Illustration des Spiels [Figure 6.1 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

Sie besitzen 300 Taler. Sie haben das Risiko, 200 von Ihren 300 Talern zu verlieren. Das Risiko des Verlustes wird durch die orangenen Bällen in der Urne dargestellt. Wenn Sie die anfängliche Urne mit 4 orangenen Bällen auswählen und ein weißer Ball gezogen wird, verlieren Sie nichts und Ihre Auszahlung beträgt in dieser Spielrunde

300 Taler. Wenn Sie einen orangenen Ball ziehen, verlieren Sie 200 Taler und Ihre Auszahlung in dieser Spielrunde wird 100 Taler betragen. Sie haben zwei Möglichkeiten. Zum einen können Sie beim anfänglichen Risiko, also der Urne mit 4 orangenen Bällen, bleiben und zum anderen können Sie das Risiko, 200 Taler zu verlieren, durch den Wechsel zu einer Urne mit nur 2 orangenen Bällen reduzieren. Dafür müssten Sie 20 Taler zahlen. Sie können die möglichen Auszahlungen für die beiden Optionen hier sehen.

Haben Sie irgendwelche Fragen oder gibt es Punkte, die wir noch einmal erklären sollten?

Subject-experimenter interactions

English: *We will now note your decision regarding the choice of bags. Which bag will you choose? Bag number 1 with 4 orange balls or bag number 2 with 2 orange balls for which you pay 20 Taler?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		**4 orange balls**	
Screen	*You have decided to choose the bag with 2 orange balls. The cost for this choice is 20 Taler, which have been deducted from your available capital. We now proceed with the random draw from your chosen bag.*		*You have decided to choose the bag with 4 orange balls. The cost for this choice is 0 Taler. We now proceed with the random draw from your chosen bag.*	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Screen	*An orange ball was drawn, which means that you have lost 200 Taler. Your payout from this game round is 80 Taler.*	*A white ball was drawn, which means that you have not lost money. Your payout from this game round is 280 Taler.*	*An orange ball was drawn, which means that you have lost 200 Taler. Your payout from this game round is 100 Taler.*	*A white ball was drawn, which means that you have not lost money. Your payout from this game round is 300 Taler.*

German: *Wir werden jetzt Ihre Entscheidung bezüglich der Wahl der Urne notieren. Welche Urne möchten Sie wählen? Die Urne mit 4 orangenen Bällen oder die Urne mit 2 orangenen Bällen, für welche Sie 20 Taler zahlen?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		4 orange balls	
Screen	*Sie haben entschieden, die Urne mit 2 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 20 Taler, welche von Ihrem verfügbaren Kapital abgezogen wurden. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*		*Sie haben entschieden, die Urne mit 4 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 0 Taler. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Screen	*Ein orangener Ball wurde gezogen. Dies bedeutet, dass Sie 200 Taler verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 80 Taler.*	*Ein weißer Ball wurde gezogen. Dies bedeutet, dass Sie kein Geld verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 280 Taler.*	*Ein orangener Ball wurde gezogen. Dies bedeutet, dass Sie 200 Taler verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 100 Taler.*	*Ein weißer Ball wurde gezogen. Dies bedeutet, dass Sie kein Geld verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 300 Taler.*

6.5 Procedures for individual insurance treatments I_{high} and I_{low} (Germany) [3]

Session instructions

English: *This game consists of an insurance game. Your initial capital is 220 Taler, which is 80 Taler less compared to the last game. However, you now have insurance. You must understand that the insurance is not for free but that you paid 80 Taler for it. During the game you have the risk of losing 200 Taler. As before, think of this as a daily life risk such as an accident. Suppose, for example, you are on campus and your bicycle is. Further examples could be damage to your mobile phone or damage to your car.*
The insurance pays you 160 Taler if and only if you have a loss. Without the insurance, you would have had to bear the full loss of 200 Taler. With the insurance you would only have a loss of 40 Taler.

The way we determine your loss is the same as in the last game, where a ball is drawn randomly from a bag. Here again you see a bag with 4 orange balls and 6 white balls [A bag with the respective number of orange and white balls is displayed on the screen]. *One ball will again be randomly drawn from this bag. If you draw an orange ball, you will lose 200 Taler, but your insurance pays you 160 Taler so your total loss is only 40 Taler.*

[3] We have two different treatments for individual insurance, I_{high} and I_{low}, which differ in the level of deductible (I_{high} deductible = 40; I_{low} deductible = 100) and hence the premium (I_{high} premium = 80; I_{low} premium = 50). Hence the instructions for these two treatments are identical except for the numerical amount of the deductible and the premium. The instructions below are for I_{high}.

However, as in the last game, we give you the chance to switch to another bag with only 2 orange balls for a payment of 20 Taler [A bag with the respective number of orange and white balls is displayed on the screen]. *This means that if you pay 20 Taler, the number of orange balls is reduced from 4 to 2.*

As in the last game, you may think of switching the bags as being more careful in life, for example, to spend money on a good lock for your bicycle, buy a wrapper for your mobile phone or just be more careful, e.g., through careful driving. Again, more careful behaviour is costly in real life so that in the game, the 20 Taler reflect the cost you would pay for the bag with less orange balls. In the case you switch the bags, we will randomly draw a ball from the second bag containing 2 orange balls and 8 white balls. Again, if you draw an orange ball, you lose 200 Taler, but your insurance pays you 160 Taler so your total loss is only 40 Taler.

You will play this game for three rounds. At the beginning of each round you will receive the same initial capital of 220 Taler. In the following, we provide a graphical illustration of the game [Figure 6.2 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

You have 220 Taler available and you are insured. You have the risk of losing 200 of your 220 Taler. The risk of losing is represented by the orange balls in the bag. In case you choose the initial bag with 4 orange balls and if a white ball is drawn, you do not lose and your payout from this game is 220 Taler. If an orange ball is drawn, you lose 200 Taler; however, your insurance pays you 160 Taler. So your loss is only 40 Taler and your payout from this game is 180 Taler. You now have another option, which is to reduce the risk of losing 200 Taler by switching to the bag with only 2 orange balls. For that you would need to pay 20 Taler. In both cases the insurance pays you 160 Taler if you have a loss. You can see the possible payouts for the two options here.

Do you have any questions or are there things we should explain again?

German.– Dieses Spiel besteht aus einem Versicherungsspiel. Ihr Startkapital beträgt 220 Taler, somit 80 Taler weniger als im letzten Spiel. Diesmal haben Sie aber eine Versicherung. Sie müssen verstehen, dass die Versicherung nicht kostenlos ist und Sie 80 Taler dafür gezahlt haben. Während des Spiels haben Sie das Risiko, 200 Taler zu verlieren. Nehmen Sie wie zuvor an, dass es sich um ein alltägliches Lebensrisiko

handelt. Wie in den zwei Beispielen vom letzten Spiel beschrieben, könnte Ihr Fahrrad gestohlen werden oder Ihr Handy oder Auto beschädigt werden.

Die Versicherung zahlt Ihnen 160 Taler dann und nur dann, wenn Sie einen Verlust haben. Ohne die Versicherung würden Sie den gesamten Verlust von 200 Talern tragen müssen. Mit der Versicherung hätten Sie nur einen Verlust von 40 Talern.

Das Verfahren, wie wir Ihren Verlust bestimmen, ist dasselbe wie im letzten Spiel; ein Ball wird zufällig aus einer Urne gezogen. Hier sehen Sie wieder die Urne mit 4 orangenen und 6 weißen Bällen [A bag with the respective number of orange and white balls is displayed on the screen]. *Ein Ball wird wieder zufällig aus der Urne gezogen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie 200 Taler, aber Ihre Versicherung zahlt Ihnen 160 Taler, so dass Sie nur einen Gesamtverlust von 40 Talern haben.*

Wie im letzten Spiel werden Sie aber die Chance haben, zu einer anderen Urne mit nur 2 orangenen Bällen für eine Zahlung von 20 Talern zu wechseln [A bag with the respective number of orange and white balls is displayed on the screen]. *Dies bedeutet, dass, wenn Sie 20 Taler zahlen, die Anzahl orangener Bälle von 4 auf 2 reduziert wird.*

Wie im letzten Spiel können Sie sich das Wechseln der Urnen als vorsichtigeres Verhalten vorstellen, indem Sie zum Beispiel Geld für eine gutes Fahrradschloss ausgeben, eine Hülle für Ihre Handy kaufen oder einfach vorsichtiger handeln, z.B. durch umsichtiges Fahren. Vorsichtigeres Verhalten hat im wirklichen Leben einen Preis. Diese Kosten werden im Spiel durch die 20 Taler reflektiert, die Sie für die Urne mit weniger orangenen Bällen zahlen müssen. Im Fall, dass Sie die Urnen wechseln, werden wir zufällig einen Ball aus der zweiten Urne, der mit 2 orangenen und 8 weißen Bällen, ziehen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie wiederum 200 Taler, aber Ihre Versicherung zahlt Ihnen 160 Taler, so dass Sie nur einen Gesamtverlust von 40 Talern haben.

Sie werden dieses Spiel über drei Runden spielen. Zu Beginn jeder Runde werden Sie das gleiche Startkapital von 220 Talern erhalten. Im Folgenden finden Sie eine graphische Illustration des Spiels [Figure 6.2 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

Sie besitzen 220 Taler und sind versichert. Sie haben das Risiko, 200 von Ihren 220 Talern zu verlieren. Das Risiko des Verlierens wird durch die orangenen Bälle in der

Urne dargestellt. Wenn Sie die anfängliche Urne mit 4 orangenen Bällen auswählen und ein weißer Ball gezogen wird, verlieren Sie nichts und Ihre Auszahlung beträgt in dieser Spielrunde 220 Taler. Wenn Sie einen orangenen Ball ziehen, verlieren Sie 200 Taler; Ihre Versicherung zahlt Ihnen aber 160 Taler. Ihr Verlust wäre somit nur 40 Taler und Ihre Auszahlung in dieser Spielrunde würde 180 Taler betragen. Sie haben jetzt die Option, das Risiko, 200 Taler zu verlieren, durch einen Wechsel zu der Urne mit nur 2 orangenen Bällen zu reduzieren. Dafür müssten Sie 20 Taler zahlen. In beiden Fällen wird Ihnen die Versicherung 160 Taler zahlen, wenn Sie einen Verlust haben. Sie können die möglichen Auszahlungen für die beiden Optionen hier sehen.

Haben Sie irgendwelche Fragen oder gibt es Punkte, die wir noch einmal erklären sollten?

Subject-experimenter interactions

English: *We will now note your decision regarding the choice of bags. Which bag will you choose knowing that you have insurance? Bag number 1 with 4 orange balls or bag number 2 with orange balls for which you have to pay 20 Taler?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		**4 orange balls**	
Screen	*You have decided to choose the bag with 2 orange balls. The cost for this choice is 20 Taler, which have been deducted from your available capital. We now proceed with the random draw from your chosen bag.*		*You have decided to choose the bag with 4 orange balls. The cost for this choice is 0 Taler. We now proceed with the random draw from your chosen bag.*	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Screen	*An orange ball was drawn, which means that you have lost 200 Taler. But your insurance pays 160 Taler to you. Your payout from this game round is 160 Taler.*	*A white ball was drawn, which means that you have not lost money. Your payout from this game round is 200 Taler.*	*An orange ball was drawn, which means that you have lost 200 Taler. But your insurance pays 160 Taler to you. Your payout from this game round is 180 Taler.*	*A white ball was drawn, which means that you have not lost money. Your payout from this game round is 220 Taler.*

German: *Wir werden jetzt Ihre Entscheidung bezüglich der Wahl der Urne notieren. Welche Urne möchten Sie wählen? Die Urne mit 4 orangenen Bällen oder die Urne mit 2 orangenen Bällen, für welche Sie 20 Taler zahlen?*

Procedures contingent on participants' decisions

	Player decision			
	2 orange balls		**4 orange balls**	
Screen	*Sie haben entschieden, die Urne mit 2 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 20 Taler, welche von Ihrem verfügbaren Kapital abgezogen wurden. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*		*Sie haben entschieden, die Urne mit 4 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 0 Taler. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Screen	*Ein orangener Ball wurde gezogen. Dies bedeutet, dass Sie 200 Taler verloren haben. Ihre Versicherung zahlt Ihnen aber 160 Taler. Ihre Auszahlung in dieser Spielrunde beträgt somit 160 Taler.*	*Ein weißer Ball wurde gezogen. Dies bedeutet, dass Sie kein Geld verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 200 Taler.*	*Ein orangener Ball wurde gezogen. Dies bedeutet, dass Sie 200 Taler verloren haben. Ihre Versicherung zahlt Ihnen aber 160 Taler. Ihre Auszahlung in dieser Spielrunde beträgt somit 180 Taler.*	*Ein weißer Ball wurde gezogen. Dies bedeutet, dass Sie kein Geld verloren haben. Ihre Auszahlung in dieser Spielrunde beträgt somit 220 Taler.*

6.6 Procedures for group insurance treatments $G_{private}$ and G_{public} (Germany) [4]

Session instructions

English: *This game consists of an insurance game. Your initial capital is 250 Taler, which is 50 Taler less compared to the last game. However, you now have insurance. You must understand that the insurance is not for free but that you paid 50 Taler for it. During the game you have the risk of losing 200 Taler. As before, think of this as a daily life risk such as an accident. Suppose, for example, you are on campus and your bicycle is. Further examples could be damage to your mobile phone or damage to your car.*

The insurance pays you 100 Taler if and only if you have a loss. Without the insurance, you would have had to bear the full loss of 200 Taler. With the insurance you would only have a loss of 100 Taler.

Another feature of the insurance contract is that you are insured together with a game partner. Your game partner is one of the other experiment participants in this room. We explained that the insurance will only pay you 100 Taler when you have a loss of 200 Taler. The important aspect to understand with this group insurance is that you have to share the loss of 100 Taler that the insurance does not pay with your game

[4] We have two different treatments for group insurance, $G_{private}$ and G_{public}, which differ in whether self-protection is observable (G_{public}) or not ($G_{private}$), requiring slight variations of the instrucitons. In $G_{private}$, we let the participants know that their self-protection decision is private wheras in G_{public}, we let them know that their self-protection decision will be made available to their partner. The following instruction is for G_{public} where the instruction that differs from $G_{private}$ is underlined.

partner. This means that if you have a loss and your partner does not, he/she will pay you 50 Taler. The same happens if your partner has a loss and you do not. In that case, you pay 50 Taler to your partner. If both of you have losses or neither of you have a loss, no money is exchanged. To sum up, the loss of any one of you in your group affects the loss of the other.

The way we determine your loss is the same as in the last game, where a ball is drawn randomly from a bag. Here again you see a bag with 4 orange balls and 6 white balls [A bag with the respective number of orange and white balls is displayed on the screen]. *One ball will again be randomly drawn from this bag. If you draw an orange ball, you will lose 200 Taler, but your insurance pays you 100 Taler so your total loss is only 100 Taler. In addition your partner pays you 50 Taler if he/she does not have a loss on his/her own. Remember also that if you do not have a loss and your partner does, you will have to pay 50 Taler to him/her.*

However, as in the last game, we give you the chance to switch to another bag with only 2 orange balls for a payment of 20 Taler [A bag with the respective number of orange and white balls is displayed on the screen]. *This means that if you pay 20 Taler, the number of orange balls is reduced from 4 to 2.*

As in the last game, you may think of switching the bags as being more careful in life, for example, to spend money on a good lock for your bicycle, buy a wrapper for your mobile phone or just be more careful, e.g., through careful driving. Again, more careful behaviour is costly in real life so that in the game, the 20 Taler reflect the cost you would pay for the bag with less orange balls.

It is important for you to know that your game partner will know your decision regarding the choice of bags. Likewise, you will learn your game partner's decision.

In the case you switch the bags, we will randomly draw a ball from the second bag con-taining 2 orange balls and 8 white balls. Again, if you draw an orange ball, you lose 200 Taler, but your insurance pays you 100 Taler and the remaining loss of 100 Taler will be shared between you and your partner if only one of you two has a loss. Remember that your game partner has the same choice as you do.

You will play this game for three rounds. At the beginning of each round you will receive the same initial capital of 250 Taler. In the following, we provide a graphical

illustration of the game [Figure 6.3 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

You have 250 Taler available and you are insured together with your game partner. You and your partner both have the risk of losing 200 of your 250 Taler. The risk of losing is represented by the orange balls in the bag. Let us consider the case when you choose the initial bag with 4 orange balls. If a white ball is drawn, you do not lose. However, if your partner has a loss, you will have to pay 50 Taler to him/her. Your payout from this game then is 200 Taler. If you both do not have losses, your payout is 250 Taler. If an orange ball is drawn for you, you lose 200 Taler; however, your insurance pays you 100 Taler. So your loss is only 100 Taler. If then your game partner does not have a loss on his/her own, then he/she has to pay 50 Taler to you and your payout from the game is 200 Taler. If you both have losses, no money is exchanged between the two of you and your payout from this game is 150 Taler. Let us now consider the case when you choose to reduce the risk of losing 200 Taler by switching to the bag with only 2 orange balls. For that you would need to pay 20 Taler. Remember that your partner will learn which of the two bags you pick. In both cases the insurance pays you 100 Taler and the 100 Taler not paid by the insurance is shared between you and your game partner if only one of you has a loss. You can see the possible payouts for the two options here.

Do you have any questions or are there things we should explain again?

German.– Dieses Spiel besteht aus einem Versicherungsspiel. Ihr Startkapital beträgt 250 Taler, somit 50 Taler weniger als im letzten Spiel. Diesmal haben Sie aber eine Versicherung. Sie müssen verstehen, dass die Versicherung nicht kostenlos ist und Sie 50 Taler dafür gezahlt haben. Während des Spiels haben Sie das Risiko, 200 Taler zu verlieren Nehmen Sie wie zuvor an, dass es sich um ein alltägliches Lebensrisiko handelt. Wie in den zwei Beispielen vom letzten Spiel beschrieben, könnte Ihr Fahrrad gestohlen werden oder Ihr Handy oder Auto beschädigt werden.

Die Versicherung zahlt Ihnen 100 Taler dann und nur dann, wenn Sie einen Verlust haben. Ohne die Versicherung würden Sie den gesamten Verlust von 200 Talern tragen müssen. Mit der Versicherung hätten Sie nur einen Verlust von 100 Talern.

Eine andere Eigenschaft des Versicherungsvertrags ist, dass Sie zusammen mit einem Partner versichert sind. Ihr Partner ist einer der anderen Versuchsteilnehmer in diesem Raum. Wir erklärten, dass die Versicherung Ihnen nur 100 Taler zahlen wird,

wenn Sie einen Verlust von 200 Talern haben. Der wichtige Aspekt bezüglich dieser Gruppenversicherung ist, dass Sie den Verlust von 100 Talern, den Sie nicht von der Versicherung bezahlt bekommen, mit Ihrem Partner teilen müssen. Dies bedeutet, dass, wenn Sie einen Verlust haben und Ihr Partner nicht, er/sie Ihnen 50 Taler zahlen wird. Dasselbe passiert, wenn Ihr Partner einen Verlust hat und Sie nicht. In diesem Fall zahlen Sie dann 50 Taler an Ihren Partner. Wenn beide von Ihnen Verluste haben, wird kein Geld ausgetauscht. Zusammenfassend betrifft also jeder Verlust von irgendjemanden in Ihrer Gruppe den Verlust des anderen.

Das Verfahren, wie wir Ihren Verlust bestimmen, ist dasselbe wie im letzten Spiel; ein Ball wird zufällig aus einer Urne gezogen. Hier sehen Sie wieder die Urne mit 4 orangenen und 6 weißen Bällen [A bag with the respective number of orange and white balls is displayed on the screen]. *Ein Ball wird wieder zufällig aus der Urne gezogen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie 200 Taler, aber Ihre Versicherung zahlt Ihnen 100 Taler, so dass Sie nur einen Gesamtverlust von 100 Talern haben. Zusätzlich zahlt Ihnen Ihr Partner 50 Taler, wenn er/sie keinen eigenen Verlust hat. Merken Sie sich auch, dass Sie Ihrem Partner 50 Taler zahlen müssen, wenn Sie keinen Verlust und er/sie einen Verlust hat.*

Wie im letzten Spiel werden Sie aber die Chance haben, zu einer anderen Urne mit nur 2 orangenen Bällen für eine Zahlung von 20 Talern zu wechseln [A bag with the respective number of orange and white balls is displayed on the screen]. *Dies bedeutet, dass, wenn Sie 20 Taler zahlen, die Anzahl orangener Bälle von 4 auf 2 reduziert wird.*

Wie im letzten Spiel können Sie sich das Wechseln der Urnen als vorsichtigeres Verhalten vorstellen, indem Sie zum Beispiel Geld für eine gutes Fahrradschloss ausgeben, eine Hülle für Ihre Handy kaufen oder einfach vorsichtiger handeln, z.B. durch umsichtiges Fahren. Vorsichtigeres Verhalten hat im wirklichen Leben einen Preis. Diese Kosten werden im Spiel durch die 20 Taler reflektiert, die Sie für die Urne mit weniger orangenen Bällen zahlen müssen.

Es ist hierbei wichtig zu wissen, dass Ihr Partner Ihre Entscheidung bezüglich Ihrer Wahl der Urnen mitgeteilt bekommt. Ebenso werden Sie erfahren, welche Urne Ihr Partner gewählt hat.

Im Fall, dass Sie die Urnen wechseln, werden wir zufällig einen Ball aus der zweiten Urne, der mit 2 orangenen und 8 weißen Bällen, ziehen. Wenn Sie einen orangenen Ball ziehen, verlieren Sie wiederum 200 Taler. Ihre Versicherung zahlt Ihnen aber 100

Taler und der verbleibende Verlust von 100 Talern wird zwischen Ihnen und Ihrem Partner aufgeteilt, wenn nur einer von Ihnen einen Verlust hat. Merken Sie sich, dass Ihr Spielpartner die gleiche Wahl wie Sie hat.

Sie werden dieses Spiel über drei Runden spielen. Zu Beginn jeder Runde werden Sie das gleiche Startkapital von 250 Talern erhalten. Im Folgenden finden Sie eine graphische Illustration des Spiels [Figure 6.3 is displayed on the screen; Philippine Pesos were replaced by the lab currency "Taler"].

Sie besitzen 250 Taler und sind zusammen mit Ihrem Spielpartner versichert. Sie und Ihr Partner haben beide das Risiko, 200 von Ihren 250 Talern zu verlieren. Das Risiko des Verlierens wird durch die orangenen Bällen in der Urne dargestellt. Lassen Sie uns den Fall annehmen, dass Sie die anfängliche Urne mit 4 orangenen Bällen wählen. Wenn ein weißer Ball gezogen wird, verlieren Sie nicht. Wenn Ihr Partner aber einen Verlust hat, müssen Sie ihm/ihr 50 Taler zahlen. Ihre Auszahlung würde in dieser Spielrunde dann 200 Taler betragen. Wenn beide von Ihnen keinen Verlust haben, beträgt Ihre Auszahlung 250 Taler. Wenn ein orangener Ball für Sie gezogen wird, verlieren sie 200 Taler und Ihre Versicherung zahlt Ihnen 100 Taler. Ihr Verlust wäre somit nur 100 Taler. Wenn Ihr Partner dann keinen Verlust hat, muss er/sie Ihnen 50 Taler zahlen und Ihre Auszahlung in dieser Spielrunde beträgt 200 Taler. Wenn beide von Ihnen Verluste haben, wird kein Geld zwischen Ihnen beiden ausgetauscht und Ihre Auszahlung in dieser Spielrunde beträgt 150 Taler. Lassen Sie uns nun den Fall annehmen, dass Sie zur Urne mit nur 2 orangenen Bällen wechseln, um das Risiko, 200 Taler zu verlieren, zu verringern. Dafür müssen Sie 20 Taler zahlen. Merken Sie sich, dass Ihr Partner wissen wird, welche der beiden Urnen Sie ausgewählt haben. In beiden Fällen wird Ihnen die Versicherung 100 Taler zahlen und die 100 Taler, die nicht von Ihrer Versicherung gezahlt werden, wird zwischen Ihnen und Ihrem Partner aufgeteilt, wenn nur einer von Ihnen einen Verlust hat. Sie können die möglichen Auszahlungen für die beiden Optionen hier sehen.

Haben Sie irgendwelche Fragen oder gibt es Punkte, die wir noch einmal erklären sollten?

Subject-experimenter interactions

English: *Which bag do you think your game partner will choose? The one with 2 orange balls or the one with 4 orange balls? We will now note your decision regarding the choice of bags. Which bag will you choose? The one with 2 orange balls for which you pay 20 Taler or the initial one with 4 orange balls?*

Procedures contingent on participants' decisions

	Player decision	
	2 orange balls	**4 orange balls**
Screen	*You have decided to choose the bag with 2 orange balls. The cost for this choice is 20 Taler, which have been deducted from your available capital. We now proceed with the random draw from your chosen bag.*	*You have decided to choose the bag with 4 orange balls. The cost for this choice is 0 Taler. We now proceed with the random draw from your chosen bag.*
Result from draw	*orange ball*	*white ball*
Screen	*An orange ball was drawn, which means that you have lost 200 Taler. But your insurance pays 100 Taler to you. The total payout from this game can only be determined after we have received your partner's decision and determined his/her result. Please wait a few moments.*	*A white ball was drawn, which means that you have not lost money. The total payout from this game can only be determined after we have received your partner's decision and determined his/her result. Please wait a few moments.*

[Waiting screen until both players have made their decisions and draws.]

Procedures contingent on participants' results and the result of the game partner

	Player result			
	orange ball		**white ball**	
Result for Game partner	**orange ball**	**white ball**	**orange ball**	**white ball**
Screen	*Unfortunately your partner also experienced a loss, which is why he/she cannot pay you the 50 Taler. Your payout from this round is 130 Taler* [if switched bags]*/150 Taler* [else].	*Fortunately your partner has not experienced a loss, which is why he/she can pay you the 50 Taler. Your payout from this round is 180 Taler* [if switched bags]*/200 Taler* [else].	*Unfortunately your partner has experienced a loss, which is why you have to pay the 50 Taler to your partner. Your payout from this round is 180 Taler* [if switched bags]*/200 Taler* [else].	*Fortunately your partner also has not experienced a loss, which is why you don't have to pay 50 Taler to him/her. Your payout of this round is 230 Taler* [if switched bags]*/250 Taler* [else].

[In case of G_{public} the decision of the game partner is displayed.]

German: *Welche Urne, denken Sie, wird Ihr Partner wählen? Die Urne mit 4 orangenen Bällen oder die Urne mit 2 orangenen Bällen? Wir werden jetzt Ihre Entscheidung bezüglich der Wahl der Urne notieren. Welche Urne möchten Sie wählen? Die Urne mit 4 orangenen Bällen oder die Urne mit 2 orangenen Bällen, für welche Sie 20 Taler zahlen?*

Procedures contingent on participants' decisions

	Player decision	
	2 orange balls	**4 orange balls**
Screen	*Sie haben entschieden, die Urne mit 2 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 20 Taler, welche von Ihrem verfügbaren Kapital abgezogen wurden. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*	*Sie haben entschieden, die Urne mit 4 orangenen Bällen zu wählen. Die Kosten dieser Wahl betragen 0 Taler. Wir fahren nun mit der zufälligen Ziehung aus Ihrer gewählten Urne fort.*
Result from draw	*orange ball*	*white ball*
Screen	*Ein orangener Ball wurde gezogen. Dies bedeutet, dass Sie 200 Taler verloren haben. Ihre Versicherung zahlt Ihnen aber 100 Taler. Ihre Gesamtauszahlung in dieser Spielrunde kann nur bestimmt werden, nachdem wir auch die Entscheidung Ihres Partners erhalten und wir sein/ihr Ergebnis bestimmt haben.*	*Ein weißer Ball wurde gezogen. Dies bedeutet, dass Sie kein Geld verloren haben. Ihre Gesamtauszahlung in dieser Spielrunde kann nur bestimmt werden, nachdem wir auch die Entscheidung Ihres Partners erhalten und wir sein/ihr Ergebnis bestimmt haben.*

[Waiting screen until both players have made their decisions and draws.]

Procedures contingent on participants' results and the result of the game partner

	Player Result			
	orange ball		**white ball**	
Result for Game partner	**orange ball**	**white ball**	**orange**	**white ball**
Screen	*Leider hat Ihr Partner auch einen Verlust erfahren, wodurch er/sie Ihnen keine 50 Taler zahlen kann. Ihre Auszahlung in dieser Runde beträgt 130 Taler* [if switched bags]*/150 Taler* [else].	*Glücklicherweise hat Ihr Partner keinen Verlust erfahren, wodurch er/sie Ihnen 50 Taler zahlen kann. Ihre Auszahlung in dieser Runde beträgt 180 Taler* [if switched bags]*/200 Taler* [else].	*Leider hat Ihr Partner einen Verlust erfahren, wodurch Sie ihm/ihr 50 Taler zahlen müssen. Ihre Auszahlung in dieser Runde beträgt 180 Taler* [if switched bags]*/200 Taler* [else].	*Glücklicherweise hat Ihr Partner keinen Verlust erfahren, wodurch Sie ihm/ihr keine 50 Taler zahlen müssen. Ihre Auszahlung in dieser Runde beträgt 230 Taler* [if switched bags]*/250 Taler* [else].

[In case of G_{public} the decision of the game partner is displayed.]

Chapter 7

Experimental Protocols for Chapter 4

The general experimental procedure in this chapter is the same as in Chapter 6. The main difference is that in Chapter 6, all the treatments have insurance as a mandatory component of the treatments, whereas in this chapter, we utilize two treatments that have voluntary insurance take-up. The presentation of game procedures is as follows. In Sections 7.1 and 7.2, we present instructions for voluntary individual insurance and voluntary group insurance treatments. Since the experiments were originally conducted in the local Hiligaynon language, we also present the English translations.

7.1 Procedures for voluntary individual insurance treatment

Session instructions

English: *This game consists of an insurance game. You have now received 300 Pesos. During the game you have the risk of losing 200 Pesos. As before, think of this as a daily life risk as it was presented in the two examples from the last game where your motorcycle brakes do not work because they are old and you have an accident or a family member gets sick.*

During the game, you will have the chance to buy insurance against this loss for the cost of 50 Pesos. The insurance pays you 100 Pesos if and only if you have a loss. If you do not buy the insurance, you have to bear the full loss of 200 Pesos. With the insurance you would only have a loss of 100 Pesos.

The way we determine your loss is the same as in the last game, where we draw balls from a bag. Here again is bag number 1 with 4 orange balls and 6 white balls [One assistant shows the bag and makes the number of orange and white balls visible to the participants].

We will again ask you to draw one ball from this bag. If you draw an orange ball there are two possible situations. (1) If you did not buy the insurance, you will lose 200 Pesos and (2) if you bought the insurance, you lose 200 Pesos but get 100 Pesos from the insurer, so you end up with a loss of 100 Pesos only.

However, as in game 1, we give you the chance to switch to another bag, bag number 2, with only 2 orange balls for a payment of 20 Pesos [One assistant shows the bag

and makes the number of orange and white balls visible to the participants]. *This means that if you pay 20 Pesos, the number of orange balls is reduced from 4 to 2. If you switch the bag, how much will you pay for the bag with 2 orange balls?*

As in the last game, you may think of switching the bags as being more careful in life, for example, to spend more money to have your work equipment in good condition so you are not hurt or have an accident. Another example could be to spend more money on healthy food and drinking water to not get sick. Again, these changes cost money in real life so that in the game, this cost is reflected in the 20 Pesos you would pay for the bag with less orange balls. In the case you switch to bag number 2, you will draw a ball from the bag containing 2 orange balls and 8 white balls. As before, if you draw an orange ball there are two possible situations. (1) If you did not buy the insurance, you will lose 200 Pesos and (2) if you bought the insurance, you lose 200 Pesos but get 100 Pesos from the insurer, so you end up with a loss of 100 Pesos only. This game will be played out three times. Let me explain the game a bit more along the lines of this poster [One assistant presents a printed poster as in Figure 7.1].

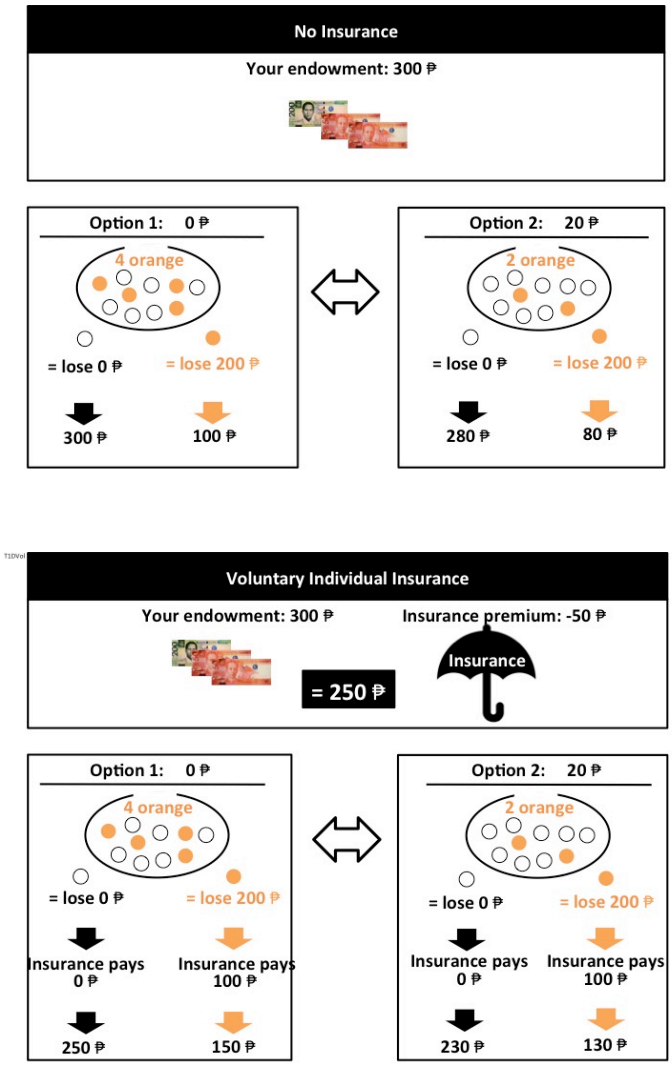


Figure 7.1: Poster to explain game in voluntary individual insurance round (English version)

Here you see the initial situation you are in. You have the risk of losing 200 of your 300 Pesos. The risk of losing is represented by the orange balls in the bag. You have the choice of either buying insurance or not buying it. Let us first consider the case in which you do not buy insurance. You can then choose to draw a ball from bag number 1 with 4 orange balls or pay 20 pesos for bag number 2 with 2 orange balls. If you choose bag number 1 and you draw an orange ball, you will lose 200 pesos and your payout from that round is 100; if you draw a white ball, you will not lose anything and your payout from that round is 300. However, if you choose bag number 2 and you draw an orange ball, you will lose 200 pesos and your payout from that round is 80; if you draw a white ball, you will not lose anything and your payout is 280.

Now, let us consider the case in which you pay 50 pesos to buy insurance. You can then choose to draw a ball from bag number 1 with 4 orange balls or pay 20 pesos for bag number 2 with 2 orange balls. If you choose bag number 1 and you draw an orange ball, you will lose 200 pesos but you will get 100 pesos from your insurer and your payout from that round is 150; if you draw a white ball, you will not lose anything and your payout from that round is 250. However, if you choose bag number 2 and you draw an orange ball, you will lose 200 pesos but you will get 100 pesos from your insurer and your payout from that round is 130; if you draw a white ball, you will not lose anything and your payout is 230. You can see the possible payouts here. Do you have any questions or are there things we should explain again?

The assistants will now call you by your player number. Please follow the assistant if you are called and remain seated in the mean time and do not talk to other players.

Hiligaynon: *Ini nga hampang gina lakipan sang insurance game. Ikaw subong maka baton sang 300 pesos, Samtang naga hampang may risgo ikaw nga mapierde sang 200 pesos. Pareho sang nag ligad ng hampang, mapa-angid naton ini sa matag adlaw nga pag pangabuhi bilang isa ka risgo pareho sa gin presenter nga duha ka halimbawa sa ulihi nga hampang kung sa diin samtang ga pakadto ka sa ubra ang preno sang imo motor wala nag gana kay daan na, kag ikaw na aksedente ukon ang miembro sang imo pamilya nag masakit. Samtang naga hampang, may chansa kamo nga mag bakal sang insurance batok sa amo ni nga kapierdihan sa bili nga 50 pesos. Ang insurance maga bayad sa imo sang 100 pesos lamang kung ikaw may kapierdihan. Kung indi ikaw mag bakal sang insurance ikaw maga salo sang kabilogan nga pierde nga 200 pesos. Pero kung may insurance ikawmapierde lang sang 100 pesos.*

Ang pamaagi namon sa paghibalo sang imo ulihi nga ka pierdihan pareho lang sang nag ligad nga hampang, kung sa diin kita mabunot sang bola sa bag. Diri sa liwat may bag nga may 4 ka orange nga bola kag 6 ka puti nga bola. [One assistant shows the bag and makes the number of orange and white balls visible to the participants].

Kami maga hinyo liwat sa imo nga mag bunot sang isa ka bola sa sini nga bag. Kung ikaw maka bunot sang orange nga bola; may ara duha ka possible nga sitwasyon. (1) kung wala ka nag bakal sang insurance, mapierde ikaw sang 200 pesos kag (2) kung mag bakal ka sang insurance, ma pierde ka 200 pesos pero ang 100 pesos nga nag halin sa insurer, sa katapusan ikaw ma pierde sang 100 pesos lamang.

Ugaling, pareho sa game 1, sa gihapon kami maga hatag sa imo sang chansa nga mag baylo sa lain nga bag,bag number 2, nga may unod nga 2 ka orange nga bola sa bayad nga 20 pesos. Buot silingon kung ikaw mag bayad 20 pesos, ang kadamuon sang orange nga bola maga nubo halin sa 4 pakadto sa 2.

Pareho sang ulihi nga hampang, ang pag baylo sang bag aton ma- anggid sa dugang nga pag halong sa aton kabuhi, halimbawa, ang pag gasto sang dako sa mga kagamitan sa trabaho para maayo ang kondisyon kag indi ikaw masakitan ukon ma-halitan ukon maaksidente. Isa pagid ka halimbawa amo ang pag gasto sang dako sa masustansya nga pagkaon kag tubig ilimnon para indi kita mag masakit. Sa liwat, ini nga mga pag baylo naga bili sang kwarta sa matuod nga pangabuhi amo man sa aton hampang, ini nga bili gina pakita sa 20 pesos nga imo pagabayaran para sa bag nga my diutay nga orange nga bola. Inkaso mag baylo ka sang bag, ikaw maga bunot sa bag nga may 2 ka orange nga bola kag 8 ka puti nga bola.Pareho sang nag ligad, kung ikaw naka bunot sang orange nga bola may ara kita duha ka possible nga sit-wasyon. (1) kung wala ikaw nag bakal sang insurance, mapierde ka sang 200 pesos kag (2) kung nag bakal ka sang insurance, mapierde ka sang 200 pesos pero ang 100 pesos maga halin sa insurer,sa ulihi ikaw mapierde sang 100 pesos lang.Ang ini nga hampang paga hampangon 3 beses. Ipa-athag ko pa gid ang ini nga hampang paagi sa ini nga poster. [One assistant presents a printed poster as in Figure 7.1].

Diri imo makit-an kung diin ka nga sitwasyon subong. May ara ka na uyatan 300 pe-sos. May ara ka risgo nga ma pierde sang 200 pesos gikan sa 270 pesos mo. Ang risgo nga ikaw mapierde gina represintar sang orange nga bola sa bag. Ikaw pwede kapili kung mabakal ikaw sang insurance ukon indi. Aton anay ikonsiderar ang una nga kaso sa diin wala ka nag bakal sang insurance. Ikaw pwede maka pili kung maga bunot sa bag number 1 nga may 4 ka orange nga bola ukon mabayad sang 20 pesos para sa bag number 2 nga may 2 orange nga bola. Kung ikaw mag pili sang bag number 1 kag ikaw maka bunot sang orange nga bola, ikaw mapierde sang 200 pesos kag ang balayran sa imo sa amo to nga round amo ang 100; kung ikaw maka bunot sang puti nga bola, ikaw wala pierde kag ang balayran sa imo sa sini nga round amo ang 200. Ugaling, kung imo pilion ang bag number 2 kag ikaw maka bunot sang orange nga bola, mapierde ka sang 200 pesos kag ang balayran sa imo sa amo to nga round amo ang 80; kung ikaw maka bunot sang puti nga bola, wala ikaw sang pierde kag ang balayran sa imo amo ang 280. Subong, aton anay ikonsiderar ang kaso sa diin nag bayad ikaw sang 50 pesos para mag bakal sang insurance. Ikaw pwede na maka pili kung bala maga bunot ka sa bag number 1 nga may 4 orange nga boa ukon mabayad ka 20 pesos para sa bag number 2 nga may 2 lang ka orange nga bola. Kung

*ikaw mapili sang bag number **1** kag maka bunot sang orange nga bola, ikaw mapierde sang 200 pesos pero maka kuha ka sang 100 pesos halin sa imo insurer kag ang balayran sa imo sa amo to nga round amo ang 150; kung ikaw maka bunot sang puti nga bola, wala ikaw sang ano man nga pierde kag ang balayran sa imo sa amo to nga round amo ang 250. Ugaling, kung ikaw magpili sang bag number **2** kag ikaw maka bunot sang orange nga bola, mapierde ka sang 200 pesos pero maka kuha ikaw sang 100 pesos halin sa imo insurer kag ang balayran sa imo sa amo nga round amo ang 130; kung ikaw maka bunot sang puti nga bola, wala ikaw sang ano man nga pierde kag ang balayran sa imo amo ang 230. May ara pa bala kamo nga mga pamangkot ukon may butang pa nga dapat ipa-athag liwat?*

Ang mga assistants maga tawag sa inyo pamaagi sang inyo player number. Palihog sunod sa assistant kung kamo gin tawag kag mag pabilin nga naga pungko anay kag indi mag estorya sa iban nga manog hampang.

Subject-experimenter interactions

***English:** We will now first note your decision regarding the insurance and in a second step let you decide about the 2 bags, one containing 4 and the other containing 2 orange balls. Now, your first decision: Would you like to buy insurance against the chance of losing 200 Pesos of your 300 Pesos at the cost of 50 Pesos?*

Procedures contingent on participants' decisions

	Player decision	
	Insurance	**No Insurance**
Assistant instruction	*Please pay 50 Pesos now.*	
Assistant instruction	*You decided to buy the insurance for 50 Pesos, so you have 250 of your 300 Pesos available. Now, we proceed to the second decision you can make in this game. Here, you have the option to choose between two bags, one containing 4 orange balls and 6 white balls and one containing only 2 orange balls and 8 white balls for which you have to pay 20 Pesos. Which bag will you choose knowing that you have insurance? The one with 2 orange or the initial one with 4 orange balls?*	*You decided not to buy the insurance, so you still have 300 Pesos available. Now, we proceed to the second decision you can make in this game. Here, you have the option to choose between two bags, one containing 4 orange balls and 6 white balls and one containing only 2 orange balls and 8 white balls for which you have to pay 20 Pesos. Which bag will you choose? The one with 2 orange or the initial one with 4 orange balls?*

[If the player bought insurance go ahead with the following:]

	Player decision (if insurance is bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 100 Pesos to you. Your payout from this round is 130 Pesos. I have noted your resul. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 230 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 100 Pesos to you. Your payout from this round is 150 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 250 Pesos. I have noted your result. Please hand your complete money over now.*
[If another round of game is played] *Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

[If the player did not buy insurance go ahead with the following:]

	Player decision (if insurance is not bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball, which means that you have lost 200 Pesos. Your payout from this round is 80 Pesos. I have noted your resul. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 280 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn an orange ball, which means that you have lost 200 Pesos. Your payout from this round is 100 Pesos. I have noted your result. Please hand your complete money over now.*	*You have drawn a white ball, which means that you have not lost money. Your payout from this round is 300 Pesos. I have noted your result. Please hand your complete money over now.*
[If another round of game is played] *Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

Hiligaynon: *Paga sulaton namon ang imo mga desisyon nahanungod sa insurance kag sa masunod nga tikang, pa-desisyonon ka namon parte sa duha ka bag, ang isa may ara 4 orange nga bola kag ang isa may ara 2 orange nga bola. Subong ano ang imo una nga desisyon; gusto mo bala mag bakal sang insurance para ma buhinan ang chansa nga ma pierde ka sang 200 pesos gikan sa imo 300 pesos sa bili nga 50 pesos?*

Procedures contingent on participants' decisions

	Player decision	
	Insurance	**No Insurance**
Assistant instruction	*Palihog bayad sang 50 peso subong.*	
Assistant instruction	*Ikaw nag desisyon nga mag bakal sang insurance sa bili nga 50 pesos, may ara ka nalang 250 pesos sa imo nga 300 pesos nga gina uyatan. Subong, mapadaun kita sa ika duha nga desisyon nga pwede mo mahimo sa sini nga hampang. Sa diri, may ara ka opsyon nga mag pili sa tunga sang duha ka bag, ang isa may ara nga 4 ka orange nga bola kag 6 ka puti nga bola kag ang isa may ara nga 2 ka orange nga bola kag 8 ka puti nga bola kung sa diin ikaw maga bayad sang 20 pesos. Diin nga bag ang imo paga pilion karun na hibaloan mo nga ikaw may insurance? Ang isa nga may 2 ka orange nga bola ukon ang isa nga may 4 ka orange nga bola?*	*Ikaw nag desisyon nga indi mag bakal sang insurance, sa gihapon may ara ka pa nga 300 pesos. Subong, maga padayon kita sa ika duha nga desisyon nga pwede mo mahimo sa sini nga hampang. Sa diri, may ara ka opsyon nga mag pili sa tunga sang duha ka bag, ang isa may ara nga 4 ka orange nga bola kag 6 ka puti nga bola kag ang isa may ara nga 2 ka orange nga bola kag 8 ka puti nga bola kung sa diin ikaw maga bayad sang 20 pesos. Diin nga bag ang imo paga pilion? Ang isa nga may 2 ka orange nga bola ukon ang isa nga may 4 ka orange nga bola?*

[If the player bought insurance go ahead with the following:]

	Player decision (if insurance is bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Palihog bayad sang 20 peso subong.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nga bola, buot silingon na pierde ka sang 200 pesos. Pero ang insurance nag bayad sa imo sang 100 pesos. Ang balayran sa imo sa sini nga round amo ang 130 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola, buot silingon wala pierde. Ang blayran sa imo sa sini nga round amo ang 230 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong."*	*Naka bunot ka sang orange nag bola, buot silingon na pierde ka sang 200 pesos. Pero ang insurance nag bayad sa imo sang 100 pesos. Ang balayran sa imo sa sini nga round amo ang 150 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola, buot silingon wala kapierde nga kwarta. Ang balayran sa imo sa sini nga round amo ang 250 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong."*
[If another round of game is played] *Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

[If the player did not buy insurance go ahead with the following:]

	Player decision (if insurance is not bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Palihog bayad sang 20 peso subong.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nga bola, buot silingon na pierde ka sang 200 pesos. Ang balayran sa imo sa sini nga round sang hampang amo ang 80 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola, buot silingon wala pierde. Ang balayran sa imo sa sini nga round sang hampang amo ang 280 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*	*Naka bunot ka sang orange nga bola, buot silingon na pierde ka sang 200 pesos. Ang balayran sa imo sa sini nga round sang hampang amo ang 100 pesos. Akon na gin sulat ang imo resulta.Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*	*Naka bunot ka sang puti nga bola, buot silingon wala kapierde nga kwarta. Ang balayran sa imo sa sini nga round sang hampang amo ang 300 pesos. Akon na gin sulat ang imo resulta. Palihog ibalik ang tanan ukon kumpleto nga kwarta subong.*
[If another round of game is played] *Here is your endowment for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

7.2 Procedures for voluntary group insurance treatment

Session instructions

English: *This game consists of an insurance game. You have now received 300 Pesos. During the game you have the risk of losing 200 Pesos. As before, think of this as a daily life risk as it was presented in the two examples from the last game where your motorcycle brakes do not work because they are old and you have an accident or a family member gets sick. During the game, you will have the chance to buy insurance against this loss for the cost of 50 Pesos. The insurance pays you 100 Pesos if and only if you have a loss. If you do not buy the insurance, you have to bear the full loss of 200 Pesos. With the insurance you would only have a loss of 100 Pesos.*

Another feature of the insurance contract is that you are insured together with your game partner. Your game partner is the person with the same group number on his/her nametag. To show you who your game partner is, we will now call the group numbers and ask you stand up when your group number is called [One assistant calls the group numbers one by one and asks the players to stand up to see each other]. *We explained that the insurance will only pay you 100 Pesos when you have a loss of 200 Pesos. The important aspect to understand with this group insurance is that you have to share the loss of 100 Pesos that the insurance does not pay amongst each other. This means that*

if you have a loss and your partner does not, he/she will pay you 50 Pesos. The same happens if your partner has a loss and you do not. In that case, you pay 50 Pesos to your partner. If both of you have losses or neither of you have a loss, no money is exchanged. To sum up, the loss of any one of you in your group affects the loss of the other.

The way we determine your loss is the same as in the last game, where we draw balls from a bag. Here again is bag number 1 with 4 orange balls and 6 white balls [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *We will again ask you to draw one ball from this bag. If you draw an orange ball, you will lose 200 Pesos, but your insurance pays you only 100 Pesos. In addition your partner pays you 50 Pesos if he/she does not have a loss on his/her own. Remember also that if you do not have a loss and your partner does, you will have to pay 50 Pesos to him/her. How much would your game partner pay you, if he/she did not lose and if you draw the orange ball?*

However, as in game 1, we give you the chance to switch to another bag, bag number 2, with only 2 orange balls for payment of 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *This means that if you pay 20 Pesos, the number of orange balls is reduced from 4 to 2. If you switch the bag with 2 orange balls, how much is the cost of the bag with 2 orange balls? As in the last game, you may think of switching the bags as being more careful in life, for example, to spend more money to have your work equipment in good condition so you are not hurt or have an accident. Another example could be to spend more money on healthy food and drinking water to not get sick.*

It is important for you to know that your game partner will not know your decision regarding the choice of bags. In the case you switch the bags, you will draw a ball from the bag containing 2 orange balls and 8 white balls. As before, if you draw an orange ball there are two possible situations. (1) If you did not buy the insurance, you will lose 200 Pesos and (2) if you bought the insurance, you will lose 200 Pesos, but your insurance pays you only 100 Pesos and the other 100 will be shared between you and your partner if only one of you two has a loss. Remember that your game partner has the same choice as you do.

Let me explain the game a bit more along the lines of this poster [One assistant presents a printed poster as in Figure 7.2].

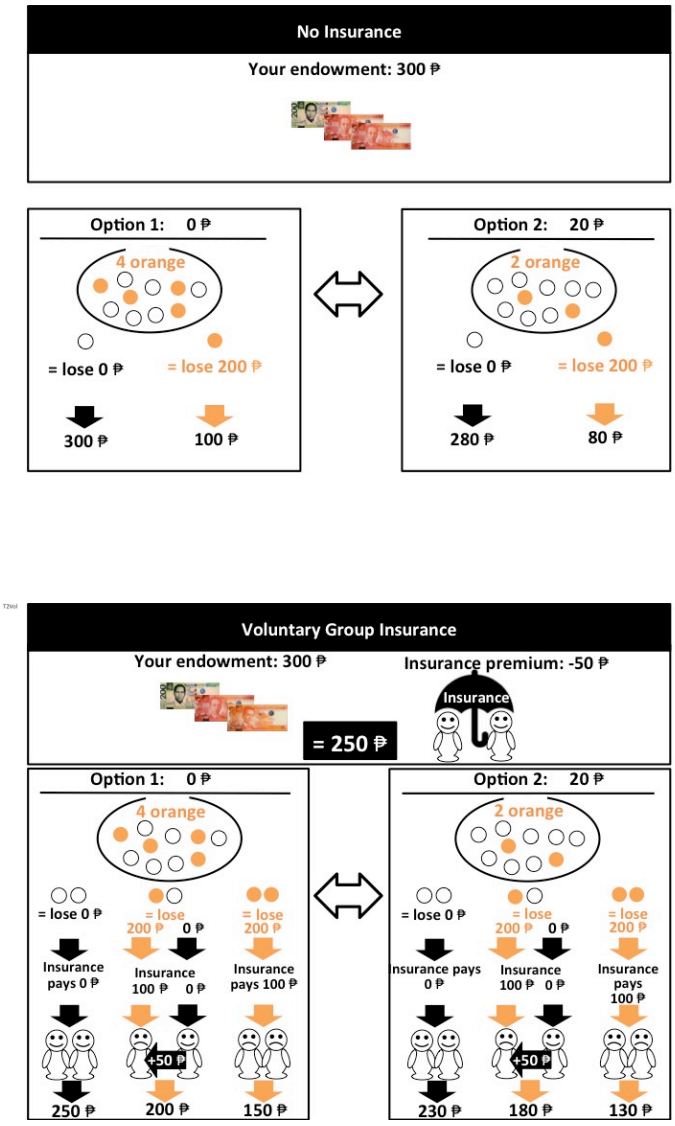


Figure 7.2: Poster to explain game in voluntary group insurance round (English version)

Here you see the initial situation you are in. You have the risk of losing 200 of your 300 Pesos. The risk of losing is represented by the orange balls in the bag. You have the choice of either buying insurance or not buying it. Let us first consider the case in which you do not buy insurance. You can then choose to draw a ball from bag number 1 with 4 orange balls or pay 20 pesos for bag number 2 with 2 orange balls. If you choose bag number 1 and you draw an orange ball, you will lose 200 pesos and your payout from that round is 100; if you draw a white ball, you will not lose anything and your payout from that round is 300. However, if you choose bag number 2 and you draw an orange ball, you will lose 200 pesos and your payout from that round is 80; if you draw a white ball, you will not lose anything and your payout is 280.

Now, let us consider the case in which you pay 50 pesos to buy insurance. You can then choose to draw a ball from bag number 1 with 4 orange balls or pay 20 pesos for bag number 2 with 2 orange balls. Let us consider the case when you choose bag number 1. If you draw a white ball, you do not lose. However, if your partner has a loss, you will have to pay 50 Pesos to him/her. Your payout from this game then is 200 Pesos. If you both do not have losses, your payout is 250 Pesos. If you draw an orange ball, you lose 200 Pesos; however, your insurance pays you 100 Pesos. So your loss is only 100 Pesos. If then your game partner does not have a loss on his/her own, then he/she has to pay 50 Pesos to you and your payout from the game is 200 Pesos. If you both have losses, no money is exchanged between the two of you and your payout from this game is 150 Pesos. Let us now consider the case when you choose to reduce the risk of losing 200 Pesos by switching to bag number 2 with only 2 orange balls. For that you would need to pay 20 Pesos. Remember that your partner will not learn which of the two bags you pick. In both cases the insurance pays you 100 Pesos and the 100 Pesos not paid by the insurance is shared between you and your game partner if only one of you has a loss. You can see the possible payouts for the two options here [Show it on the poster].

The assistants will now call you by your player number. Please follow the assistant if you are called and remain seated in the mean time and do not talk to other players.

Hiligaynon: *Ini nga hampang gina lakipan sang insurance game. Ikaw subong maka baton sang 300 pesos. Samtang naga hampang may risgo nga ma pierde ka sang 200 pesos. Pareho sang nag ligad, aton ipaangid ini sa matag adlaw nga risgo sa aton kabuhi pareho sa gin presintar nga duwa ka halimbawa sa ulihi nga hampang kung sa diin ang preno sang imo motor wala nag-gana kay daan na kag ikaw na aksidente ukon ang miembro sang imo pamilya nag masakit. Samtang naga hampang, may ara ka chansa nga mag bakal sang insurance batok sa kapierdihan sa bili nga 50 pesos. Ang insurance maga bayad sa imo sang 100 pesos lamang kung ikaw may kapier-dihan. Kung indi ka mag bakal sang insurance, ikaw ang maga solo sang bug-os nga kapierdihan sa kantidad nga 200 pesos. Kung may insurance ikaw may kapierdihan nga 100 pesos lang. Ang isa pa ka bagay nga na lakip sa kontrata sang insurance amo nga ikaw kag ang imo game partner pareho nga insured. Ang imo game partner amo ang tawo nga may pareho kamo nga group number sa iya nga name tag. Para ipakita sa imo ang inyo game partner, amon paga lawagon ang group number kag amon gina pangabay nga mag tindog kamo kung ang imo group number gina lawag.*

[One assistant calls the group numbers one by one and asks the players to stand up to see each other].

Gin eksplikar na namon nga ang insurance maga bayad lamang sa imo sang 100 pesos kung ikaw may pierde nga 200 pesos. Ang importante nga aspeto nga dapat intiendihon sa sini nga group insurance amo nga ikaw maga tunga sa kapierdihan nga 100 pesos nga indi pag bayaran sang insurance sa inyo. Buot silingon kung ikaw may pierde kag imo partner wala, sya maga bayad sa imo 50 pesos. Amo man ang matabo kung ang imo partner may pierde kag ikaw wala. Sa ina nga kaso, ikaw maga bayad sang 50 pesos sa imo partner. Kung duha kamo may kapierdihan ukon wala sang isa sa inyo ang na pierde, wala baylohanay sang kwarta nga matabo. Suma total, ang kapierdihan sang isa sa inyo grupo maka apekto sa kapierdihan sang iban.

Pamangkoton kamo namon nga duha kada isa kung gusto mo mag bakal sang insurance. Kung kamo nga duha nag pasugot nga mag bakal sang insurance, kamo nga duha maga bayad sang 50 pesos para sa insurance kada isa. Kung isa lang ang mabakal sang insurance, kita mag coin toss para mahibaloan kung duha kamo mabakal sang insurance kag mag bayad sang 50 pesos, ukon duha kamo indi mag bakal sang insurance.

Ang pamaagi namon sa paghibalo sang imo ulihi nga ka pierdihan pareho lang sang nag ligad nga hampang, kung sa diin kita mabunot sang bola sa bag. Ari sa liwat ang bag number 1 nga may 4 ka orange nga bola kag 6 ka puti nga bola [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Kami maga hinyo liwat sa imo nga mag bunot sang isa ka bola sa sini nga bag. kung ikaw maka bunot sang orange nga bola may arak a duh aka possible nga sitwasyon. (1) kung wala ka nag bakal sang insurance, ikaw mapierde sang 200 pesos kag (2) kung ikaw nag bakal sang insurance , ikaw mapierde sang 200 pesos, pero ang imo insurance maga bayad sang 100 pesos lang. Sa dugang ang imo partner maga bayad sa imo sang 50 pesos kung sya wala sang kaugalingon nga pierde. Dumdomon nga kung ikaw wala sang pierde kag ang imo game partner may ara, kinahanglan mo mag bayad sang 50 pesos sa iya.*

Ugaling, pareho sa game 1, kami maga hatag sa imo sang chansa nga mag baylo sa lain nga bag, bag number 2, nga may unod nga 2 ka orange nga bola sa bayad nga 20 Pesos [One assistant shows the bag and makes the number of orange and white balls visible to the participants]. *Buot silingon kung ikaw mag bayad 20 Pesos, ang ka-*

damuon sang orange nga bola maga nubo halin sa 4 pakadto sa 2. Kung mag baylo ka sang bag, pila ang imo ibayad para sa bag nga may 2 ka orange nga bola?

Pareho sang ulihi nga hampang, ang pag baylo sang bag aton ma- anggid sa dugang nga pag halong sa aton kabuhi, halimbawa, ang pag gasto sang dako sa mga kagamitan sa trabaho para maayo ang kondisyon kag indi ikaw masakitan ukon ma-halitan ukon maaksidente. Isa pagid ka halimbawa amo ang pag gasto sang dako sa masustansya nga pagkaon kag tubig ilimnon para indi kita mag masakit. Sa liwat ang ini nga mga pag bago maga bili sang kwarta sa matuod nga pangabuhi amo man sa hampang, ang ini nga bili gina pakita sang 20 pesos nga kinahanglan mo bayaran para sa bag nga may diutay nga orange nga bola.

Importante nga ma bal-an mo nga ang imo partner sa hampang indi makahibalo sang imo disisyon parte sa gin pili mo nga mga bag. Makahibalo bala ang imo game part-ner parte sa bag nga imo gin pili? Inkaso mag baylo ka sang bag, ikaw maga bunot sa bag nga may 2 ka orange nga bola kag 8 ka puti nga bola. Pareho sang una, kung ikaw makabunot sang orange nga bola may ara duha ka posible nga sitwasyon. (1) kung wala ka nag bakal sang insurance ikaw mapierde sang 200 pesos kag (2) kung ikaw nag bakal sang insurance, ikaw mapierde sang 200 pesos, pero ang imo insur-ance maga bayad lang sa imo sang 100 pesos kag ang nabilin nga 100 paga tungaon nimo kag sang imo partner kung ang isa sa inyo nga duha may kapierdihan. Dum-duma nga ang imo game partner sa hampang may pareho man nga chansa sang pag pili pareho sa imo.

Ipa-athag ko pa gid kung paano ang hampang pama-agi sa sini nga poster [One assis-tant presents a printed poster as in Figure 7.2].

Diri imo makita ang inisyal nga sitwasyon kung sa diin ka subong. Ikaw may ara 300 pesos. May arak a risgo nga mapierde sang 200 pesos sa imo nga 300 pesos. Ang risgi nga mapierdee ka gina representar sang orange nga bola sa bag. Pwede ka kapili nga mag bakal sang insurance ukon indi. Aton nga ikonsiderar ang kaso nga kung sa diin wala ka nag bakal insurance. Pwede kana maka pili nga mag bunot sang bola sa bag number 1 nga may 4 ka orange nga bola ukon mabayad 20 pesos para sa bag number 2 nga may 2 ka orange nga bola. Kung gin pili mo ang bag number 1 kag aikaw naka bunot sang orange nga bola, ikaw mapierde sang 200 pesos kag ang balayran sa imo sa amo to nga round amo ang 100 pesos; kung maka bunot ka sang puti nga bola, wa-la ka sang bisan ano nga pierde kag ang balayran sa imo sa amo to nga round amo ang 300. Ugaling, kung ikaw mapili sang bag number 2 kag ikaw maka bunot sang

orange nga bola, ikaw mapierde sang 200 pesos kag ang balayran sa imo sa amo to nga round amo ang 80; kung maka bunot ka sang puti nga bola wala ka sang bisan ano nga pierde kag anga balayran sa imo amo ang 280. Subong, aton ikonsiderar ang kaso sa kung diin nag bayad ka sang 50 pesos para mag bakal sang insurance. Pwede ka makapili nga mag bunot sang bola sa bag number 1 nga may 4 ka orange nga bola ukon mag bayad sang 20 pesos para sa bag number 2 nga mat 2 ka orange nga bola. Aton konsiderahon sa kaso nga imo gin pili ang bag number ***1.*** *Kung ikaw maka bunot sang puti nga bola, wala ikaw sang pierde. Ugaling, kung ang imo partner may pierde, ikaw maga bayad sang 50 pesos sa iya. Ang balayran sa imo sa sini nga hampang amo ang 200 pesos. Kung kamo nga duha wala sang pierde, ang balayran sa inyo amo ang 250 pesos. Kung maka bunot ka sang puti nga bola, may pierde ka bala? ukon may balayran ang insurance sa imo? Kung ikaw maka bunot sang orange nga bola, ikaw ma pierde sang 200 pesos; ugaling, ang imo insurance maga bayad sa imo sang 100 pesos. Ang imo nga pierde 100 pesos lamang. Kung ang imo partner sa hampang wala sang kaugalingon nga pierde, sya maga bayad sang 50 pesos sa imo kag ang balayran sa imo amo ang 200 pesos. Pero kung kamo nga duha may kapierdihan, wala sang pag baylohanay sang kwarta nga matabo kag ang balayran sa imo sa sini nga hampang amo ang 150 pesos. Aton konsiderahon sa kaso nga imo gin pili nga panubu-on ang risgo nga mapierde sang 200 pesos paagi sa pag baylo sa bag number 2 nga may ara lang 2 ka orange nga bola. Para sa ina kinahanglan mo mag bayad sang 20 pesos. Dumduma nga ang imo partner indi maka hibalo kung sa diin sa duha ka bag ang imo gin pili. Sa duha ka kaso ang insurance maga bayad sang 100 pesos kag ang 100 pesos nga wala gin bayaran sang insurance paga tungaon mo kag sang imo game partner kung isa lang sa inyo may pierde. Diri mo makita ang posible nga paga bayaran sa duha ka opsyon.*

Ang mga assistant maga tawag sa inyo pamaagi sang inyo player number. Palihog sunod sa assistant kung kamo gin tawag kag mag pabilin nga naga pungko anay kag indi mag estorya sa iban nga manog hampang.

Subject-experimenter interactions

English: *We will now first note your decision regarding the insurance and in a second step let you decide about the 2 bags, one containing 4 and the other containing 2 orange balls. Now, your first decision: Would you like to buy insurance against the chance of losing 200 Pesos of your 300 Pesos at the cost of 50 Pesos together with your game partner? If both of you agree to buy the insurance, you both pay the 50 Pesos for the insurance each. If only one wants to buy the insurance, we will let a coin*

toss determine whether both of you buy the insurance and pay the 50 Pesos or whether both of you do not buy the insurance.

Procedures contingent on participants' decisions

<table>
<tr><th colspan="4">Players' decision</th></tr>
<tr><th>Both insurance</th><th colspan="2">Disagreement</th><th>Both against</th></tr>
<tr><td rowspan="3">You and your game partner both decided to buy the insurance for 50 Pesos. Please pay the 50 Pesos for the insurance now. You now have 250 of your 300 Pesos available and you have insurance together with your game partner.</td><td colspan="2">You and your game partner disagreed on buying the insurance. As we said earlier, in this case a coin toss will decide whether both of you will buy the insurance or not. I will now toss a 1 peso coin; if it shows the side with "1 piso" on it, you will buy the insurance and pay 50 Pesos each. If the other side is up, no insurance will be bought for both of you.

[Toss the 1 peso coin.]</td><td rowspan="3">You and your game partner both decided not to buy the insurance, so you still have 300 Pesos available and no insurance.</td></tr>
<tr><td>Coin shows "1 piso"</td><td>Otherwise</td></tr>
<tr><td>You and your game partner will buy the insurance for 50 Pesos. Please pay the 50 Pesos for the insurance now. You now have 250 of your 300 Pesos available and you have insurance together with your game partner.</td><td>You and your game partner both decided not to buy the insurance, so you still have 300 Pesos available and no insurance.</td></tr>
<tr><td colspan="4">Now, we proceed to the second decision you can make in this game. Here, you have the option to choose between two bags, one containing 4 orange balls and 6 white balls and one containing only 2 orange balls and 8 white balls for which you have to pay 20 Pesos. Which bag will you choose knowing that you have insurance? The one with 2 orange or the initial one with 4 orange balls?</td></tr>
</table>

[Dependent on the players' decision the following is performed by the assistant:]

	Player decision	
	2 orange balls	**4 orange balls**
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]	[The assistant lets the player draw from the bag with 4 orange balls]
Result from draw	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball, which means that you have lost 200 Pesos. But your insurance pays 100 Pesos to you. Please hand the 100 Pesos loss not paid by the insurance to me. The total payout from this game can only be determined after we have taken the decisions from all game participants and is dependent on your game partners' outcome. Please keep your remaining money, go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*	*You have drawn a white ball, which means that you have not lost money. The total payout from this game can only be determined after we have taken the decisions from all game participants and is dependent on your game partners' outcome. Please keep your remaining money, go back to your seat and wait until you are called in again. Please do not talk or communicate with other players."*

[After everyone has made the decision and drawn from one of the bags, one assistant calls the players again individually by player number.]

Procedures contingent on participants' results and the result of the game partner

	Player result			
	orange ball		**white ball**	
Result for game partner	**orange ball**	**white ball**	**orange ball**	**white ball**
Assistant instruction	*As you remember, you had a loss of 200 Pesos of which 100 Pesos were paid by the insurance. Unfortunately your partner also experienced a loss, which is why he/she cannot pay you the 50 Pesos. Your payout from this round is 130 Pesos (if switched bags)/150 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had a loss of 200 Pesos of which 100 Pesos were paid by the insurance. Fortunately your partner has not experienced a loss, which is why he/she can pay you the 50 Pesos. Your result of this round now is 180 Pesos (if switched bags)/200 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had no loss. Unfortunately your partner has experienced a loss, which is why you have to pay the 50 Pesos to your partner. Your result of this round now is 180 Pesos (if switched bags)/200 Pesos (else). I have noted your result. Please hand your complete money over now.*	*As you remember, you had no loss. Fortunately your partner also has not experienced a loss, which is why you don't have to pay 50 Pesos to your partner. Your result of this round now is 230 Pesos (if switched bags)/250 Pesos (else). I have noted your result. Please hand your complete money over now.*
[An assistant lets the player know about his/her game partners' bag choice.]				
[If another round of game is played] *Here is your endowment of 300 Pesos for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

[If the player did not buy the insurance go ahead with the following:]

	Player decision (if insurance is not bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*You have drawn an orange ball which means that you have lost 200 Pesos. Your payout from this round is 80 Pesos.*	*You have drawn a white ball which means that you have not lost money. Your payout from this round is 280 Pesos.*	*You have drawn an orange ball which means that you have lost 200 Pesos. Your payout from this round is 100 Pesos.*	*You have drawn a white ball which means that you have not lost money. Your payout from this round is 300 Pesos.*
[If another round of game is played] *Here is your endowment of 300 Pesos for the next round. Please go back to your seat and wait until you are called in again. Please do not talk or communicate with other players.*				

Hiligaynon: *Ang masunod nga pamangkot wala labot sa iban namon nag pamangkot, pero gusto lang namon mahibaloan kung ano ang imo gina ekspektar sa imo nga game partner. Diin sa pamatyag mo ang bag nga paga pilion sang imo game partner? Ang isa nga may 2 ka orange nga bola ukon ang isa nga may 4 ka orange nga bola? Amon paga sulaton ang imo desisyon parte sa bag nga imo gin pili. Diin nga bag ang imo paga pilion kung nahibaloan mo nga may ara ka insurance kaupod ang imo game partner? Ang isa nga may 2 ka orange nga bola kung sa diin maga bayad ka sang 20 pesos ukon ang nauna nga may 4 ka orange nga bola?*

Procedures contingent on participants' decisions

<table>
<tr><th colspan="4">Players' decision</th></tr>
<tr><th>Both insurance</th><th colspan="2">Disagreement</th><th>Both against</th></tr>
<tr><td rowspan="3">Ikaw kag ang imo game partner pareho nga nag desisyon nga mag bakal sang insurance sa bili nga 50 pesos. Palihog bayad subong sang 50 pesos para sa insurance. Ikaw subong may 250 pesos halin sa imo 300 pesos kag may insurance kamo nga duha sang imo game partner.</td><td colspan="2">Ikaw kag ang imo game partner wala nag-sugtanay nga mag bakal sang insurance. Sa gin hambal namon kagina, sa amo ni nga kaso ang coin toss amo ang maga desisyon kung bala kamo nga duha maga bakal sang insurance ukon indi. Ako subong maga itsa sang piso; kung mag guwa ang bahin nga may 1 piso, kamo maga bakal sang insurance kag maga bayad sang 50 pesos kada isa. Kung ang pihak nga bahin ang maga guwa, indi kamo nga duha mag bakal sang insurance.
[Toss the 1 peso coin.]</td><td rowspan="3">Ikaw kag ang imo game partner pareho nga nag desisyon nga indi mag bakal sang insurance, Amo nga may ara ka pa sa gihapon san 300 pesos kag wala insurance.</td></tr>
<tr><td>Coin shows "1 piso"</td><td>Otherwise</td></tr>
<tr><td>Ikaw kag imo game partner mabakal sang insurance sa bili nga 50 pesos. Palihog bayad subong sang 50 pesos para sa insurance. Ikaw subong may 250 pesos halin sa imo 300 pesos kag may insurance kamo nga duha sang imo game partner.</td><td>Ikaw kag ang imo game partner pareho nga nag desisyon nga indi mag bakal sang insurance, Amo nga may ara ka pa sa gihapon san 300 pesos kag wala insurance.</td></tr>
<tr><td colspan="4">Subong, mapadaun kita sa ika duha nga desisyon nga imo mahimo sa sini nga hampang.Diri pwede ka kapili sa duha ka bag, ang isa may unod nga 4 ka orange nga bola kag 6 ka puti nga bola kag ang isa may unod nga 2 ka orange nga bola kag 8 ka puti nga bola kung sa diin ikaw maga bayad sang 20 pesos. Diin nga bag ang imo paga pilion karun nga nahibaloan mo na nga ikaw may insurance. Ang isa nga may 2 ka orange nga bola ukon ang una nga may 4 ka orange nga bola?</td></tr>
</table>

[Dependent on the players' decision the following is performed by the assistant:]

	Player decision	
	2 orange balls	**4 orange balls**
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]	[The assistant lets the player draw from the bag with 4 orange balls]
Result from draw	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nag bola buot silingon na pierde ka sang 200 pesos. Ugaling ang imo insurance maga bayad sa imo sang 100 pesos. Palihog hatag sa akon sang 100 pesos nga pierde nga indi pag bayaran sang insurance. Ang kabilogan nga balayran sa imo sa sini nga hampang mahibaloan lang pag katapos namon kuha sang disisyon sa tanan nga manog hampang kag naga depende sa resulta sang imo game partner. Palihog tago sang nabilin nga kwarta, balik sa imo pulongkuan, kag mag hulat asta lawagon ka liwat.Palihog indi mag istorya ukon mag kumunikar sa iban nga manog hampang.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde. Ang balayran sa imo sa sini nga hampang mahibaloan lamang pag katapos namon kuha sang desisyon sa tanan nga manog hampang kag naga depende sa resulta sang imo game partner. Palihog tago sang nabilin nga kwarta, balik sa imo pulongkuan kag mag hulat asta lawagon ka liwat.Palihog indi mag istorya ukon mag kumunikar sa iban nga manog hampang.*

[After everyone has made the decision and drawn from one of the bags, one assistant calls the players again individually by player number.]

Procedures contingent on participants' results and the result of the game partner

	Player result			
	orange ball		**white ball**	
Result for game partner	**orange ball**	**white ball**	**orange ball**	**white ball**
Assistant instruction	Sa imo nadumduman, napierde ka sang 200 pesos sa diin 100 pesos ang bayaran sang insurance. Ugaling sa kadimalason ang imo nga partner na pierde man, sa diin indi sya maka bayad sa imo sang 50 pesos. Ang balayran sa imo sa sini nga round amo ang 130 pesos (if switched the bags)/150 pesos (else).	Sa imo na dumduman, pierde ka sang 200 pesos sa diin 100 pesos ang bayaran sang insurance. Maayo lang ang imo nga partner wala na pierde, Amo nga maka bayad sya sa imo sang 50 pesos. Ang balayran sa imo sa sini nga round amo ang 180 pesos (if switched the bags)/200 pesos (else).	Sa imo na dumduman, wala ka pierde. Ugaling sa kadimalason ang imo nga partner na pierde, sa diin kinahanglan mo mag bayad sang 50 pesos sa imo nga partner. Ang balayran sa imo sa sini nga round amo ang 180 pesos (if switched the bags)/200 pesos (else).	Sa imo na dumduman, wala ka pierde. Mayo lang ang imo nga partner wala man na pierde, sa diin indi na kinahanglan pa nga mag bayad sang 50 peso sa imo partner. Ang balayran sa imo sa sini nga round amo ang 230 pesos (if switched the bags)/250 pesos (else).
[An assistant lets the player know about his/her game partners' bag choice.]				
[If another round of game is played] *Akon na gin sulat ang resulta sang imo hampang. Palihog balik sang tanan ukon kompleto nga kwarta subong. Palihog balik sa imo pulongkuan kag mag hulat asta nga matawag ka liwat. Palihog indi mag estorya o mag kumunikar sa iban nga manog hampang.*				

[If the player did not buy the insurance go ahead with the following:]

	Player decision (if insurance is not bought)			
	2 orange balls		**4 orange balls**	
Assistant instruction	*Please pay 20 Pesos now.* [If the player has paid, the assistant lets her or him draw from the bag with 2 orange balls]		[The assistant lets the player draw from the bag with 4 orange balls]	
Result from draw	*orange ball*	*white ball*	*orange ball*	*white ball*
Assistant instruction	*Naka bunot ka sang orange nga bola buot silingon pierde ka sang 200 Pesos. Ang balayran sa imo sa sini nga round amo ang 80 Pesos.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde. Ang balayran sa imo sa sini nga round amo ang 280 Pesos.*	*Naka bunot ka sang orange nga bola buot silingon pierde ka sang 200 Pesos. Ang balayran sa imo sa sini nga round amo ang 100 Pesos.*	*Naka bunot ka sang puti nga bola buot silingon wala ka pierde. Ang balayran sa imo sa sini nga round amo ang 300 Pesos.*
[If another round of game is played] *Akon na gin sulat ang imo resulta. Palihog balik sang tanan nga kwrata subong. Ari ang imo nga kwarta para sa sunod nga round. Palihog balik sa imo pulongkuan, kag mag hulat asta lawagon ka liwat. Palihog indi mag istorya ukon mag kumunikar sa iban nga manog hampang.*				

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Curriculum Vitae

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08/2006 – 12/2009	**MS in Food Policy and Applied Nutrition**, Friedman School of Nutrition Science and Policy, Tufts University, USA
05/2001 – 05/2005	**BA in Mathematics-Economics**, *magna cum laude,* Agnes Scott College, USA

Work experience

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10/2008 – 12/2008	**Research Analyst**, South Asia Watch on Trade, Economics, and Environment, Nepal
05/2008 – 08/2008	**Project Manager**, Microloan Foundation, USA and Malawi
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07/2005 – 07/2006	**Research Assistant**, Kiley and Company, USA

Honors, Awards, and Achievements

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Fletcher Board of Overseers Scholarship, (full-tuition scholarship) (2007 – 2009)
Tufts Institute of the Environment Fellowship (2009)
Tufts Institute for Global Leadership Fellowship (2009)

Blakeley Fellowship for Microfinance (2008)
Friedman Scholarship (full-tuition scholarship) (2006 – 2009)
Hubert Scholarship for Public Service (2004 – 2005)
Kauffman Center for Entrepreneurial Leadership Fellowship (2004 – 2005)
Laura Mayes Scholarship (full-tuition scholarship), Agnes Scott College (2001 – 2005)

Publications

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