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The impact of trust, risk and disaster exposure on microinsurance demand: Results of a DCE analysis in Cambodia

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Abstract

Natural disasters are increasing in frequency and intensity and have devastating impacts on individuals, both humanitarian and economic, particularly in developing countries. Microinsurance is seen as one promising instrument of disaster risk management, however the level of demand for respective projects remains low. Using behavioural games and a discrete choice experiment, this paper analyses the demand for hypothetical microinsurance products in rural Cambodia and contributes significant household level evidence to the current research. A general preference for microinsurance can be found, with demand significantly affected by price, provider, requirements for prevention and combinations with credit. Furthermore, financial literacy, risk aversion, levels of trust and previous disaster experience impact the individual demand for flood insurance in rural Cambodia.

Keywords: microinsurance, trust, risk, discrete choice experiment, Cambodia

JEL: Q10, Q50, Q54, O10, C25

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This paper presents the empirical results of a discrete choice experiment in rural Cambodia and is part of the PhD research project, "Experiencing natural disasters: how this influences risk, trust and the demand for microinsurance", by Oliver Fiala.

1 Introduction

A growing number of natural disasters as well as increasing economic and humanitarian impacts are evident. This is driven by a higher vulnerability towards the effects of hazards as well as the rising frequency and intensity of disasters due to climate change. Developing countries, especially poor communities, are particularly exposed to climate risks because of their location in high-risk areas, their economic dependence on agriculture and higher rates of population growth. Furthermore, the damage caused by disasters affects development processes and hinders poverty reduction efforts. (IPCC 2012; Ahsan 2014; Surminski & Oramas-Dorta 2011)

The reduction of risk exposure and vulnerability as well as the creation of response institutions are some forms of disaster prevention, and more broadly, of disaster risk management. Risk financing strategies, and insurance solutions in particular, have gained much attention in the academic literature. Microinsurance provides easily accessible and affordable insurance for life, property, crops and health against the risks of natural disasters. In addition to the reduction of risks for low-income households, insured individuals and small businesses are more creditworthy and are more likely to invest in productive assets. Additionally, investment in prevention measures can be encouraged through a carefully designed and implemented insurance scheme. Although microinsurance is seen as a promising instrument by both academics and practitioners, in many microinsurance pilots, demand was consistently low and insurances often failed to scale up to a sustainable size. (Linnerooth-Bayer et al. 2011; Clarke & Grenham 2013; Mechler et al. 2006; Surminski & Oramas-Dorta 2014; Biener & Eling 2012; Eling et al. 2014; De Bock & Gelade 2012)

This paper investigates the impact of several determinants – including individual risk-taking propensity, levels of trust, exposure to risk – on the demand for microinsurance. A discrete choice experiment accompanied by a survey and behavioural games were conducted in rural Cambodia.

The paper is structured as follows: Chapter 2 presents a brief introduction to the issue of microinsurance demand. Chapters 3 and 4 present the method and data used in the research. Chapter 5 will show and explain the results, with a conclusion in chapter 6.

2 The demand for microinsurance products against disaster risk

Various economic and social factors are found in the academic literature to explain the individual demand for microinsurance products. Following the framework by Outreville (2013) and Eling et al. (2014), 12 determinants – economic, social, structural and personal factors – can be distinguished. These include, among others, the price of the product, wealth and income, individual levels of risk aversion and trust, the existence of other risk sharing networks and exposure to risk. (Outreville 2013; Eling et al. 2014; Cole et al. 2013; Giné & Yang 2009; Giné et al. 2008; Cole et al. 2007; Mahul & Skees 2007)

Economic factors include the price of the insurance product as well as individual wealth or income. As expected, empirical evidence shows a negative effect of price on microinsurance demand. Several studies show a higher probability of insurance uptake when the price of the product decreased or vouchers or subsides were disbursed (Cole et al. 2013; Mobarak & Rosenzweig 2012; Karlan et al. 2014; Brouwer & Akter 2010; Arshad et al. 2015; Giné et al. 2008; Viverita et al. 2010). When investigating the role of wealth and income, empirical studies suggest that wealthier households are more likely to buy insurance (Giné et al. 2008; Cole et al. 2013; Gaurav et al. 2011; Giné & Yang 2009; Arshad et al. 2015; Akotey et al. 2011; Akter et al. 2008).

Social and cultural factors include risk aversion, non-performance risk of the insurance, the individual levels of trust, religion and education/financial literacy. Risk aversion and trust in particular are found to play a significant role in explaining microinsurance demand. In contrast to traditional insurance markets, individuals with a higher level of risk aversion are found to be less likely to buy microinsurance products (Giné et al. 2008; Giné & Yang 2009; Giesbert et al. 2011; Dercon et al. 2011; Cole et al. 2013). One explanation for this observation may be the existence of non-performance risk – uncertainty which can arise from insurer bankruptcy or contract exclusions – and therefore the perception of insurance as a risky product itself (Eling et al. 2014). Therefore trust in the insurance company and product are necessary, particularly in countries with weak institutions for contract enforcements (Cole et al. 2013; Eling et al. 2014). Empirical evidence shows a positive relationship between trust and microinsurance demand (Giné et al. 2008; Cai et al. 2009; Dercon et al. 2011; Cole et al. 2013; De Bock & Gelade 2012; Eling et al. 2014; Liu et al. 2013). Furthermore, there is some evidence that religion or fatalism is

associated with higher demand (Gheyssens & Günther 2011; Cole et al. 2013). Finally, financial literacy is found to have a positive impact on microinsurance demand, providing a better understanding of insurance as a risk management instrument, as well as of the specific product and its terms (Giné et al. 2008; Cole et al. 2013; Akotey et al. 2011; Heenkenda 2014; Brata et al. 2014; Patt et al. 2009; Cai et al. 2011; Gaurav et al. 2011; Dercon et al. 2014).

Structural factors encompass the existence of alternative and informal risk-sharing networks, the quality of the product and the risk exposure of the individual. Empirical research shows ambiguous effects of informal risk-sharing networks on insurance demand due to their nature of either substitutes or complements for insurance products (De Bock & Gelade 2012; Clarke & Dercon 2009). The role of quality is considered only for health insurance, where a positive link between service quality and insurance demand is evident (Eling et al. 2014). Finally, the risk exposure of the individual has a significant impact on the demand for microinsurance, although the direction of this effect is not clear. Previous experience of disasters can update an individual's information and perceptions and encourage households to develop adaptation strategies (Turner et al. 2014; Liu et al. 2015; Eling et al. 2014; Karlan et al. 2014; Galarza & Carter 2011). However, the experience of external assistance following a disaster from various sources (governments, charities etc.) may negatively impact the demand for insurance products ('charity hazard') (Raschky et al. 2012; Kousky et al. 2013; Albarran & Attanasio 2005).

Personal factors such as age and gender have mostly been included as control variables in empirical studies. Previous research finds highly ambiguous results for both factors (Giesbert et al. 2011; Gaurav et al. 2011; Turner et al. 2014; Giné et al. 2008; Heenkenda 2014; Arshad et al. 2015; Guo 2015).

Table 1 presents an overview of the various determinants and their effect on demand, following the survey structure by Eling et al. (2014). The following empirical analysis investigates the effects of the various determinants presented above on the demand for disaster insurance in rural Cambodia.

Table 1: Determinants of microinsurance demand and evidence of literature

Category	Variable	Effect on demand*
Economic factors	Price	–
	Wealth/Income	+
Social and cultural factors	Risk aversion	–/(+)
	Non-performance and basis risk	–
	Trust and peer effects	+/(–)
	Religion/fatalism	+
	Financial literacy and education	+
Structural factors	Informal risk sharing	+/–
	Quality of service	+
	Risk exposure	+/–
Personal and demographic factors	Age	+/(–)
	Gender	+/–

Determinants for microinsurance demand follow the structure of Eling et al. (2014) and Outreville (2013).
**Empirical evidence for sign of determination following the survey by Eling et al. (2014). Effects in parentheses are found by one reference only.*

3 Method

In order to elicit individual preferences, discrete choice experiments (DCE) provide an instrument to reveal an individual's valuation of product attributes, stating their choice over hypothetical product alternatives. Discrete choice experiments emerged as an attractive tool in situations where the importance of specific characteristics of a good or service cannot be observed based on actual choices. Therefore, the strength of an individual's preferences as well as their probability for purchasing the product can be investigated. This is of particular interest for analysing hypothetical demand for products which are not yet available. (Mangham et al. 2009; Navrud & Magnussen 2013; WHO 2012; Reynaud & Nguyen 2012)

While discrete choice experiments in developing countries have becoming particularly popular for economic valuations in health economic research, only a small number of studies have been conducted on insurance demand against disaster risk. This method can provide important insights into the relationship between the individual's willingness to pay and the various attributes of the hypothetical insurance scheme. (Guo 2015; Navrud & Magnussen 2013; Brouwer et al. 2013; Reynaud & Nguyen 2012; Brouwer & Akter 2010; Mangham et al. 2009)

Theoretical framework of DCE

A discrete choice experiment asks the respondents to state their choice over sets of hypothetical alternatives, each of which is described by multiple attributes/characteristics. A regression analysis then estimates the individual value of every attribute as well as the willingness to trade one attribute for another, and therefore identifies the determinants of the product. With a basis on random utility theory and utility maximisation, the method relies on the individual choosing the alternative which provides the highest value given their own assessment of risk preferences. However, discrete choice experiments assume stable and coherent preferences of individuals, who must therefore be capable of selecting a preferred insurance product on the basis of the presented attributes. Although a choice experiment presents a real-world decision-making situation (in comparison to the ranking of alternatives), it focuses on given responses rather than

on the observation of actual behaviour. (Mangham et al. 2009; Nghiem & Duong 2012; Brouwer et al. 2013; WHO 2012)

The underlying random utility model contains a deterministic and a stochastic part. While the former is a function of the product attributes and individual characteristics, the latter is an error term capturing non-observed factors which impact the individual's utility. The resulting model is a linear function of all attributes and the 'opt-out' option. The 'opt-out' or 'status quo' option represents the choice of the baseline alternatives, in this case no purchase of any insurance product, and are usually not specified. Furthermore, individual characteristics are included as interaction terms. The regression models usually consist of a dichotomous or polychotomous categorically dependent variable. Conditional logit, mixed logit/random parameter logit and multinomial logit models are used in the literature to estimate the indirect utility function (Reynaud & Nguyen 2012; Brouwer et al. 2013; Mangham et al. 2009)

Empirical evidence

There is a limited scope of academic research investigating determinants and willingness to pay for flood insurance in developing countries by using discrete choice experiments. Brouwer & Akter (2010) analysed the demand for microinsurance of flood-affected households in rural Bangladesh. A range of insurance schemes were offered (including property, crops, health and unemployment), with various cover sums, premiums and providers. The affordability of the product played a crucial role, however risk exposure (previous experience of floods) did not affect the demand. Nghiem & Duong (2012) investigated microinsurance demand in Vietnam, finding a willingness to pay a higher premium in order to receive higher pay-out levels. Investigating the determinants for flood insurance in Vietnam, Reynaud & Nguyen (2012) conducted a discrete choice experiment including different insurance types, providers, cover sums and premiums. A strong preference for the status quo (no insurance) was found. Health insurance was the preferred insurance product, provided by a state-owned company. Finally, Brouwer et al. (2013) investigated willingness to pay for flood insurance in Vietnam, finding a substantial demand. Higher insurance cover with the government as product provider was preferred by the respondents.

4 Data

Design of choice sets

Prior to conducting a choice experiment in rural Cambodia, various attributes and their levels had to be established, after which hypothetical alternatives were combined into choice sets. To ensure that respondents are able to consider all attributes for their choice, less than ten attributes are usually used in order to reduce cognitive difficulties. The resulting choice sets consist of two or more alternatives as well as an 'opt-out' option, if applicable. Both a full or fractional factorial design can be used. Whilst the former consists of all possible combinations between the various attribute levels, the latter can be used for larger choice sets as long as the design is orthogonal (no correlation between estimated parameters) and balanced (equal numbers of each attribute level). (Mangham et al. 2009; Huber & Zwerina 1996)

In the next step, several relevant attributes were selected, following previous research in developing countries, including cover sum, premium and provider (Reynaud & Nguyen 2012; Brouwer et al. 2013; Brouwer & Akter 2010; Arshad et al. 2015). However, no crop insurance existed at the time of the experiment in Cambodia. Therefore, assumptions for premium and cover sums had to be made based on available data from demand studies in other developing countries as well as economic performance indicators in Cambodia (Brouwer & Akter 2010; Akter 2012; Cai et al. 2013; World Bank 2014; Cambodia National Institute of Statistics 2014). No accurate information regarding flood risk in the specific study area of rural Cambodia was available. Premiums were set based on their affordability and their relation to the offered pay-outs and were between 1% and 5% of the household income, following the previous studies of Brouwer & Akter (2010) and Akter (2012). The third attribute, 'provider', consisted of five levels, including national and provincial government, private company, non-governmental organisation and the community itself (the village as provider). Furthermore, the preferences for indemnity- or index-based insurance schemes as well as for a combination with a loan were investigated (Mechler et al. 2006; Clarke & Grenham 2013). Finally, the requirement of client prevention efforts in order to receive insurance were added, to assess the relationship between insurance and prevention (Surminski & Oramas-Dorta 2014; Linnerooth-Bayer & Hochrainer-Stigler 2015;

Mechler et al. 2006). However, no specific costs or conditions for both prevention efforts or credit were given. Table 2 shows the different attributes and levels of the choice sets.

Table 2: Attributes and levels

Attribute	Level
Cover for loss	200,000 Riel
	500,000 Riel
	1,000,000 Riel
Premium (per week)	800 Riel
	2,000 Riel
	4,000 Riel
Condition for pay-out	Pay-out after a visit of insurance employee (indemnity-based)
	Pay-out if measuring station has indicated a flood (index-based)
Credit	Combination of insurance with loan
	No combination of insurance and loan
Prevention	No prevention effort
	Insurance requires additional prevention effort
Provider	National government
	Provincial government
	Private company
	NGO
	Village

Every choice set was accompanied by an 'opt-out' option, offering the individual the choice of the baseline alternative (no insurance). The six attributes presented above result in 360 possible insurance combinations. The rotation design algorithm by Aizaki (2012) was used in order to create a fractional factorial design. 48 unique alternatives could be constructed representing all characteristics of the proposed insurances, using the catalogue-based approach by Johnson et al. (2007) and Chrzan & Orme (2000).

In the following step, 24 choice sets were designed, each providing three alternatives (insurance A, insurance B, no insurance), whereby the attributes were distributed independently and equally over the various choice sets. In order to consider the cognitive capacity of the participants, all choice sets have been grouped in four versions (Reynaud & Nguyen 2012). Each participant of the interview was presented with one group of six choice sets. The appendix presents a sample of the choice set.

The choice of a particular alternative within the choice set follows utility maximisation. Thereby, the utility of one alternative (j) given a certain choice set (k) is assumed to comprise a

deterministic part $V(X_{jk}|\beta)$ and a random part ϵ_{ijk}. With ϵ from a type I extreme value distribution, the individual utility for an alternative (j) U_{ijk} is given by:

$$U_{ijk} = V\left(X_{ijk}\middle|\beta\right) + \epsilon_{ijk}$$

In order to assess average individual preferences, a condition logit model is used, starting with a basic model of each alternative, consisting of an additive function of the six attributes and a dummy variable representing the utility of the 'opt-out' option.

$$V_j = Premium_j + Cover_j + Provider_j + Type_j + Prevention_i + Credit_j + Optout$$

Weekly premium and cover sum are noted in Cambodia Riel. The attribute 'provider' is a dummy variable, which equals to one for non-governmental organisation, private company, provincial government and village (with national government as baseline). The attribute 'type' is equal to one for an index-based insurance scheme and 'prevention' is equal to one if the insurance requires prevention efforts of the individual. Finally, if the dummy variable 'credit' is equal to one, it represents a loan and insurance bundle.

The model assumes that differences in utility only arise from differences in insurances, rather than in individual characteristics. Therefore, in order to investigate the effects of individual attributes (risk aversion, level of trust, experience with disasters, income, financial literacy etc.), and to elicit individual preferences, interaction terms between attributes of the conditional logit model (including the 'opt-out' option) and personal characteristics are measured.

Scope of research

The data was collected through surveys and experiments in six villages in rural areas of Cambodia. Villages in the Thma Koul district in Battambang province were selected, comprised of households both affected and unaffected by severe flooding in October 2013. The research was conducted in September 2014 with the support of the University of Battambang (UBB). Two experimental games investigating the levels of risk attitudes and levels of trust were conducted, followed by a questionnaire which finished with the discrete choice experiment.

The behavioural experiments followed the instance by Schechter (2007), which investigated risk attitudes and levels of trust in Peru and provided advice for handling typical problems associated with such experimental games in developing countries, including lack of literacy and numeracy skills in rural areas. A similar design is used by Ahsan (2014) in Bangladesh. Due to the significant value of money (at the local level) used in the games, participants' actions more closely reflect real-life risk decisions (Schechter 2007). In the risk game, each participant was endowed with a certain amount of money, of which he or she could bet a share. Thereafter, the participants rolled a dice, which determined a negative, neutral or positive outcome. The share bet in the risk game is defined as risk-taking propensity. The trust game follows the so-called investment game by Berg et al. (1995). A participant is endowed with the same amount of money as in the risk game, which he or she can send to an anonymous second player. Any amount sent is tripled. In the next round, the second player can return money to the first player, if he or she wishes. Money sent by the first player is an indicator of the participant's level of trust, while money returned by the second player is defined as trustworthiness (Schechter 2007; Berg et al. 1995).

The survey that followed the games included questions on household characteristics, previous experiences of natural disaster and questions regarding disaster risk management activities as well as prevention and preparedness toward floods. The questionnaire was developed with orientation on similar surveys in the relevant literature (Ahsan et al. 2014; Reynaud & Nguyen 2012; Schechter 2007) and discussed with researchers from the University of Battambang. Following the survey, the above presented discrete choice experiment was conducted.

5 Results

A conditional logit model was estimated in order to elicit preferences for microinsurance demand against disaster risk. Table 3 presents the results of the estimation.

Table 3: Results of discrete choice experiment (conditional logit model)

	Model 1	Model 2	Model 3
Premium	-127.010***	-156.786***	-194.924***
	(42.562)	(44.567)	(55.600)
Cover	0.082 (0.130)	0.116 (0.134)	0.184 (0.143)
Condition for pay-out (Index-based insurance)	0.115 (0.112)	0.105 (0.118)	0.237* (0.134)
Credit (Combination with loan)	0.184* (0.105)	0.187* (0.110)	0.537*** (0.175)
Prevention (Insurance requires additional prevention effort)	-0.137 (0.105)	-0.104 (0.110)	-1.541*** (0.527)
Provider (Provincial government)	0.133 (0.146)	0.193 (0.151)	0.156 (0.162)
Provider (Private company)	0.172 (0.150)	0.212 (0.156)	0.264 (0.172)
Provider (Non-governmental organisation)	0.379** (0.157)	0.404** (0.163)	0.296 (0.182)
Provider (Village)	0.106 (0.141)	0.144 (0.147)	0.147 (0.162)
No insurance	-0.373** (0.185)	-1.179*** (0.370)	-1.670** (0.778)
No insurance : Affected		0.659*** (0.184)	2.128*** (0.407)
No insurance : Share bet in risk game		-0.928** (0.384)	-1.624*** (0.543)
No insurance : Share sent in trust game		1.988*** (0.384)	1.957*** (0.550)
No insurance : Financial literacy		-0.466*** (0.069)	-0.388*** (0.095)
Premium : Total income per capita in US Dollars (2013)			0.216* (0.114)
Credit (Combination with loan) : Household without credit			-0.403* (0.210)
Prevention (Insurance requires effort) : Importance of prevention			0.328*** (0.115)
No insurance : Ability for prevention			0.244** (0.103)
No insurance : Consequences of flood			-0.730*** (0.108)
No insurance : Vulnerability of household			0.119 (0.175)
No insurance : Received money/goods from government			0.737** (0.288)
No insurance : Received money/goods from charities			0.211 (0.288)
No insurance : Agricultural land owned in ha			0.159* (0.086)
No insurance : Use of chemical fertiliser			1.021*** (0.320)
Number of observations	3,309	3,219	2,949
Akaike information criterion (AIC)	1,955	1,775	1,351
Adjusted McFadden R^2	0.025	0.090	0.253

*Standard errors in parenthesis, *** p < 0.01, ** p < 0.05, * p < 0.10.*

The price of the insurance significantly and negatively impacts the demand for the product, a result which follows both empirical findings as well as the standard theory (Cole et al. 2013;

Mobarak & Rosenzweig 2012; Karlan et al. 2014; Brouwer & Akter 2010; Arshad et al. 2015; Giné et al. 2008; Viverita et al. 2010). However, this effect is found to decrease slightly with increasing income.

The respondents are found to have a preference for insurance products which are bundled with a credit. Therefore a complementary relationship between the two products can be found (Giné et al. 2008; Akter et al. 2008; Arshad et al. 2015). However, the bundle with a loan was particularly attractive for individuals who already had credit.

As expected, insurance products which require additional prevention efforts from the individual are less preferred than adequate products without any prevention requirements. However, this effect is smaller for individuals who evaluate prevention as important. However, for a more detailed consideration of the effect of prevention on insurance demand, specific prevention projects and associated costs must be provided.

In term of insurance providers, respondents show a preference for non-governmental organisations over the national government (although this effect becomes insignificant in model 3). When asked after the discrete choice experiment, respondents preferred the village/immediate community as provider, followed by the national government and non-governmental organisations. Finally, model 3 shows significance for a preference towards index-based schemes.

By including an 'opt-out' option in every choice set, the respondents were able to show a preference for the status quo over any insurance scheme. The significant and negative coefficient for 'No insurance' indicates that insurance, and therefore change, is preferred to the status quo. However, this effect is slightly smaller for individuals who believe they have greater prevention capabilities and insurance is therefore specifically demanded by more vulnerable respondents.

The demand for insurance is greater on average from individuals with higher levels of financial literacy. This result therefore supports the assumption found in the academic literature, that low financial literacy and therefore a lesser understanding of insurance products may be an explanation for low uptake rates of microinsurance schemes in developing countries (Giné et al. 2008; Cole et al. 2013; Akotey et al. 2011; Heenkenda 2014; Brata et al. 2014; Patt et al. 2009; Cai et al. 2011; Gaurav et al. 2011; Dercon et al. 2014).

Risk aversion is found to have a negative impact on insurance demand, which – although in contrast to traditional insurance theory – follows empirical evidence regarding microinsurance (Giné et al. 2008; Giné & Yang 2009; Giesbert et al. 2011; Dercon et al. 2011; Cole et al. 2013). The perception of the insurance instrument as a risky element itself as well as ambiguity aversion can explain why more risk-taking individuals are more likely, on average, to purchase microinsurance. Despite the relatively high lump sum an individual receives in case of a disaster, no indicators are found to suggest that the insurance is seen as a pure gamble in order to improve livelihoods, for instance by migration into urban areas.

Trust is found to have a significant effect on the overall interest in insurance. Individuals who display a higher level of trust show, on average, a lower demand for microinsurance (positive relationship between level of trust and status quo). This result is contrary to the outcomes found by most other studies (Giné et al. 2008; Cai et al. 2009; Dercon et al. 2011; Cole et al. 2013; De Bock & Gelade 2012; Eling et al. 2014; Liu et al. 2013). Interpersonal trust, as measured by the used investment game, is usually seen as an indicator for a general level of trust towards others (De Bock & Gelade 2012). Due to participants' unfamiliarity with insurance products, it is unlikely that this result indicates 'peer effects', depending on previous negative experience. However, the effect can be explained if the measurement of trust used in this paper concentrates solely on interpersonal trust within the community. In this case, trust towards other members of the community may reflect the efficiency of informal, community-based risk-sharing instruments, which operate as substitutes to insurance products (De Bock & Gelade 2012; Arnott & Stiglitz 1991; Brata et al. 2014). Despite the fact that the presence of trust – and more broadly, social capital – does not automatically imply the existence of any informal insurance, the access to networks and social capital can be used as a proxy for informal instruments (Dercon 2002; Morsink 2012). In this context, empirical evidence shows a lower interest in health insurance products in more cohesive communities and a higher trust in informal instruments (Jowett 2003).

Individuals with previous experience of natural disasters show a higher preference for the status quo and therefore less interest in insurance, although this effect is smaller for individuals expecting more severe consequences in the future. While several previous studies show the opposite effect for risk exposure (Akter et al. 2008; Arun & Bendig 2010; Brata et al. 2014; Turner et al. 2014; Liu et al. 2015), there is also academic research supporting this result (Giesbert et al.

2011; Arun et al. 2012; Grislain-Letrémy 2015). Although the distinction of underlying factors explaining risk exposure is empirically difficult, the result indicates that the updating of information may be of particular importance. Previous disaster experience can provide information about existing coping strategies, including the stability of informal risk-sharing instruments in the case of the realisation of a systemic risk. Moreover, new information about the frequency and severity of floods may lead to a reassessment of the individual flood risk. However, this result can also be explained by the role of heuristics, resulting in the underestimation of future events after the experience of a severe shock (Galarza & Carter 2011; De Bock & Gelade 2012).

Individuals who have received support from the government following a previous disaster have a significantly lower demand for microinsurance. Therefore, the presented discrete choice experiment shows evidence of charity hazard – the crowding out of market-based insurance by external assistance (Raschky et al. 2012; Raschky & Schwindt 2011; Kousky et al. 2013). Similar results can found in other recent studies in developing countries (Turner et al. 2014; Liu et al. 2015; Grislain-Letrémy 2015).

Finally, this study shows that individuals owning more agricultural land have on average a higher preference for the status quo, a result which align with observations by Arshad et al. (2015) in Pakistan. Similarly, individuals using chemical fertiliser – a proxy for more developed farmers – are less likely to buy microinsurance. However, this may be a result of developing adaptation strategies and therefore a higher level of resilience – ranging from physical coping mechanisms to psychological strategies – which reduce the perception of damages and therefore decrease the value of flood insurance (Turner et al. 2014).

6 Conclusion

The higher vulnerability of populations in developing contexts and the increasing frequency and intensity of natural hazards are likely to increase the already significant economic and humanitarian effects of natural disasters. Microinsurance products continue to gain the interest of both academics and practitioners. Although seen as a promising instrument, the demand for these projects remains low.

This paper investigated the impact of various determinants on the hypothetical demand for microinsurance in rural Cambodia. A discrete choice experiment is used in order to elicit individual preferences for various product attributes and to analyse the role of determinants, including individual risk-taking propensity, levels of trust and exposure to flood risks.

Overall, the study shows a preference for change and therefore an interest in the presented microinsurance products, with a particular demand for insurance from more vulnerable individuals. As expected, the price of the product was found to have a negative effect on the demand for microinsurance, although the effect decreased with higher incomes. Furthermore, a preference for a bundle of insurance with credit was found, emphasising the complementary nature of the relationship of both products. Non-governmental organisations are preferred as providers over the national government and insurance products with additional prevention requirements were less in demand.

Greater financial literacy and therefore a better understanding of the insurance product increases the demand for microinsurance. A negative effect of risk aversion on insurance demand was found, a result that contrasts with traditional insurance theory but aligns with previous microinsurance research. One explanation for this observation may be the perception of insurance instruments as risky elements in themselves. Surprisingly, higher individual levels of trust were found to have a significantly negative effect on the demand for microinsurance. Therefore it can be argued that interpersonal trust – as measured by the investment game – may be a proxy for individuals' reliance on the stability and efficiency of informal, community-based risk-sharing instruments, which operate as substitutes to insurance products. Moreover, individuals with previous experience of natural disasters are less likely to buy the microinsurance

products, although this effect decreases with higher expectations of severe consequences in the future. Finally, this paper shows empirical evidence for charity hazard – the crowding out of market-based insurance products by the provision of external assistance from the government or non-governmental organisations.

These results contribute significant household level evidence to the current research investigating the determinants of microinsurance demand, using a unique data set following a discrete choice experiment, an extensive survey and two behavioural experiments in rural Cambodia. However, microinsurance is only one possible risk management instrument amongst others, and its efficiency relies on a broader risk management scheme. Moreover, this research concentrates solely on demand-side effects, although supply-side effects should be investigated in context and in detail, in order to create a sustainable insurance product.

References

Ahsan, D., 2014. Does natural disaster influence people's risk preference and trust? An experiment from cyclone prone coast of Bangladesh. *International Journal of Disaster Risk Reduction*, 9, pp.48–57.

Ahsan, S.M. et al., 2014. *Risk, Deprivation and Vulnerability Facing the Rural Poor of Bangladesh*,

Aizaki, H., 2012. Basic Functions for Supporting an Implementation of Choice Experiments in R. *Journal of Statistical Software*, 50(Code Snippet 2).

Akotey, O.J., Osei, K.A. & Gemegah, A., 2011. The demand for micro insurance in Ghana. *The Journal of Risk Finance*, 12(3), pp.182–194.

Akter, S. et al., 2008. *Determinants of Participation in a Catastrophe Insurance Programme: Empirical Evidence from a Developing Country*, Canberra.

Akter, S., 2012. The Role of Microinsurance as a Safety Net Against Environmental Risks in Bangladesh. *The Journal of Environment & Development*, 21(2), pp.263–280.

Albarran, P. & Attanasio, O.P., 2005. Do public Transfers Crowd Out Private Transfers? Evidence from a Randomized Experiment in Mexico. In S. Dercon, ed. *Insurance against poverty*. Oxford: UNU-WIDER Studies in Development Economics / Oxford University Press, pp. 281–304.

Arnott, R. & Stiglitz, J.E., 1991. Moral Hazard and Nonmarket Institutions: Dysfunctional Crowding Out or Peer Monitoring? *American Economic Review*, 81(1), pp.179–190.

Arshad, M. et al., 2015. What drives the willingness to pay for crop insurance against extreme weather events (flood and drought) in Pakistan? A hypothetical market approach. *Climate and Development*, pp.1–11.

Arun, T. & Bendig, M., 2010. *Risk management among the poor: The case of microfinancial services*, Bonn: IZA Discussion Paper 5174.

Arun, T., Bendig, M. & Arun, S., 2012. Bequest Motives and Determinants of Micro Life Insurance in Sri Lanka. *World Development*, 40(8), pp.1700–1711.

Berg, J., Dickhaut, J. & McCabe, K., 1995. Trust, reciprocity, and social history. *Games and Economic Behavior*, 10, pp.122–142.

Biener, C. & Eling, M., 2012. Insurability in Microinsurance Markets: An Analysis of Problems and Potential Solutions. *The Geneva Papers on Risk and Insurance Issues and Practice*, 37(1), pp.77–107.

De Bock, O. & Gelade, W., 2012. *The Demand for Microinsurance: A Literature Review*, Geneva: Microinsurance Innovation Facility Research Paper 26.

Brata, A.G. et al., 2014. *Living with the Merapi Volcano: Risks and Disaster Microinsurance*, Canberra: ANU Working Papers in Trade and Development 13.

Brouwer, R. et al., 2013. Modeling demand for catastrophic flood risk insurance in coastal zones in Vietnam using choice experiments. *Environment and Development Economics*, 19(02), pp.228–249.

Brouwer, R. & Akter, S., 2010. Informing micro insurance contract design to mitigate climate change catastrophe risks using choice experiments. *Environmental Hazards*, 9(1), pp.74–88.

Brown, T.C. et al., 2008. Reliability of individual valuations of public and private goods: Choice consistency, response time, and preference refinement. *Journal of Public Economics*, 92(7), pp.1595–1606.

Burks, S. V., Carpenter, J.P. & Verhoogen, E., 2003. Playing both roles in the trust game. *Journal of Economic Behavior & Organization*, 51(2), pp.195–216.

Cai, H. et al., 2009. *Microinsurance, Trust and Economic Development: Evidence from a randomized natural field experiment*, Cambridge (Mass.): NBER Working Paper Series 15396.

Cai, H. et al., 2013. *The Effect of Microinsurance on Economic Activities: Evidence from a Randomized Field Experiment*, Philadelphia: University of Pennsylvania.

Cai, J., Janvry, A. De & Sadoulet, E., 2011. *Social Networks and Insurance Take-Up: Evidence from a randomized experiment in Chi*, Geneva: Microinsurance Innovation Facility Research Paper 8.

Cambodia National Institute of Statistics, 2014. *Cambodia Socio-Economic Survey 2013*, Phnom Penh: Kingdom of Cambodia, Ministry of Planning.

Cardenas, J.C. & Carpenter, J., 2008. Behavioural Development Economics: Lessons from Field Labs in the Developing World. *Journal of Development Studies*, 44(3), pp.311–338.

Chrzan, K. & Orme, B., 2000. An Overview and Comparison of Design Strategies for Choice-Based

Conjoint Analysis. In *Proceedings of the Sawtooth Software Conference*. Sequim, WA: Sawtooth Software Conference Proceedings, pp. 161–178.

Clarke, D. & Dercon, S., 2009. *Insurance, Credit and Safety Nets for the Poor in a World of Risk*, New York: UN/DESA Working Paper 81.

Clarke, D.J. & Grenham, D., 2013. Microinsurance and natural disasters: Challenges and options. *Environmental Science & Policy*, 27, pp.S89–S98.

Cohen, M. & McCord, M.J., 2003. Financial Risk Management Tools for the Poor. *Microinsurance Centre Briefing Note #6*. Available at: http://www.microsave.net/files/pdf/MIC_BN_6.pdf [Accessed November 26, 2015].

Cole, S. et al., 2013. Barriers to Household Risk Management: Evidence from India. *American Economic Journal: Applied Economics*, 5(1), pp.104–135.

Cole, S., Tobacman, J. & Topalova, P., 2007. *Weather Insurance: Managing Risk Through an Innovative Retail Derivative*, Cambridge (Mass.), Oxford & Washington, D.C.: Havard Business School, Oxford University, IMF.

Dercon, S., 2002. Income Risk, Coping Strategies, and Safety Nets. *The World Bank Research Observer*, 17(2), pp.141–166.

Dercon, S. et al., 2014. Offering rainfall insurance to informal insurance groups: Evidence from a field experiment in Ethiopia. *Journal of Development Economics*, 106, pp.132–143.

Dercon, S., Gunning, J. & Zeitlin, A., 2011. *The Demand for Insurance Under Limited Trust: Evidence from a Field Experiment in Kenya*, Madison: University of Wisconsin, Agriculture & Applied Economics.

Eling, M., Pradhan, S. & Schmit, J.T., 2014. The Determinants of Microinsurance Demand. *The Geneva Papers on Risk and Insurance Issues and Practice*, 39(2), pp.224–263.

Fiala, O. & Wende, D., 2016. *The impact of trust, risk and disaster exposure on microinsurance demand: Results of a DCE analysis in Cambodia*, Dresden: Dresden Contributions to Economics.

Galarza, F.B. & Carter, M.R., 2011. *Risk Preferences and Demand for Index Insurance in Peru: A Field Experiment*, Lima: Universidad del Pacífico, Documento de Discusión DD/11/08.

Gaurav, S., Cole, S. & Tobacman, J., 2011. Marketing Complex Financial Products in Emerging

Markets: Evidence from Rainfall Insurance in India. *Journal of Marketing Research*, 48, pp.S150–S162.

Gheyssens, J. & Günther, I., 2011. *Risk experiments in gains and losses: Do rural villagers want micro-insurance?*, Zurich: ETH Discussion paper.

Giesbert, L., Steiner, S. & Bendig, M., 2011. Participation in Micro Life Insurance and the Use of Other Financial Services in Ghana. *Journal of Risk and Insurance*, 78(1), pp.7–35.

Giné, X., Townsend, R. & Vickery, J., 2008. Patterns of Rainfall Insurance Participation in Rural India. *The World Bank Economic Review*, 22(3), pp.539–566.

Giné, X. & Yang, D., 2009. Insurance, credit, and technology adoption: Field experimental evidence from Malawi. *Journal of Development Economics*, 89(1), pp.1–11.

Grislain-Letrémy, C., 2015. *Natural Disasters: Exposure and Underinsurance*, Paris: CREST, Paris-Dauphine University.

Guo, W., 2015. Farmers' Perception of Climate Change and Willingness to Pay for Weather -Index Insurance in Bahunepati, Nepal. *Himalayan Research Papers Archive*, 9(1).

Heenkenda, S., 2014. *Prospective Demand for an Index-Based Microinsurance in Sri Lanka*, Munich: MPRA Paper 54420.

Huber, J. & Zwerina, K., 1996. The Importance of Utility Balance in Efficient Choice Designs. *Journal of Marketing Research*, 23, pp.307–317.

IPCC, 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* C. B. Field et al., eds., Cambridge (UK) & New York: Cambridge University Press.

Johnson, F.R. et al., 2007. Valuing Environmental Amenities Using Stated Choice Studies. In B. J. Kanninen, ed. *Valuing Environmental Amenities Using Stated Choice Studies*. The Economics of Non-Market Goods and Resources. Dordrecht: Springer Netherlands, pp. 159–202.

Jowett, M., 2003. Do informal risk sharing networks crowd out public voluntary health insurance? Evidence from Vietnam. *Applied Economics*, 35(10), pp.1153–1161.

Karlan, D. et al., 2014. Agricultural Decisions after Relaxing Credit and Risk Constraints. *The Quarterly Journal of Economics*, 129(2), pp.597–652.

Kousky, C., Michel-Kerjan, E.O. & Raschky, P. a, 2013. *Does Federal Disaster Assistance Crowd Out Private Demand for Insurance*, Philadelphia: University of Pennsylvania, Working Paper 2013-10.

Linnerooth-Bayer, J. & Hochrainer-Stigler, S., 2015. Financial instruments for disaster risk management and climate change adaptation. *Climatic Change*, 133(1), pp.85–100.

Linnerooth-Bayer, J., Mechler, R. & Hochrainer-Stigler, S., 2011. Insurance against Losses from Natural Disasters in Developing Countries. Evidence, Gaps and the Way Forward. *Journal of Integrated Disaster Risk Management*, 1(1), pp.59–81.

Liu, X., Tang, Y. & Miranda, M.J., 2015. *Does Past Experience in Natural Disasters Affect Willingness-to-Pay for Weather Index Insurance? Evidence from China*,

Liu, Y. et al., 2013. *Borrowing from the insurer: An empirical analysis of demand and impact of insurance in China*, Geneva: Microinsurance Innovation Facility Research Paper 34.

Mahul, O. & Skees, J., 2007. *Managing Agricultural Risk at the Country Level: The Case of Index-Based Livestock Insurance in Mongolia*, Washington, D.C.: The World Bank Policy Research Working Paper 4325.

Mangham, L.J., Hanson, K. & McPake, B., 2009. How to do (or not to do)...Designing a discrete choice experiment for application in a low-income country. *Health Policy and Planning*, 24(2), pp.151–158.

Mechler, R., Linnerooth-Bayer, J. & Peppiatt, D., 2006. *Disaster Insurance for the Poor? A review of microinsurance*, Geneva, Vienna: ProVention, IIASA.

Mobarak, A.M. & Rosenzweig, M., 2012. *Selling Formal Insurance to the Informally Insured*, New Haven: Economic Growth Center Discussion Paper 1007.

Morsink, K., 2012. *Weathering the Storm: The Demand for and Impact of Microinsurance in Africa*. University of Twente.

Navrud, S. & Magnussen, K., 2013. Valuing the Impacts of Natural Disasters and the Economic Benefits of Preventing Them. In D. Guha-Sapir & I. Santos, eds. *The Economic Impacts of Natural Disasters*. New York: Oxford University Press, pp. 57–79.

Nghiem, S.H. & Duong, A.H., 2012. Preferences of Micro-insurance products: Evidence from the mutual assistance fund in Vietnam. *Journal of Agricultural Economics and Development*, 1(5),

pp.106–114.

Outreville, J.F., 2013. The Relationship Between Insurance and Economic Development: 85 Empirical Papers for a Review of the Literature. *Risk Management and Insurance Review*, 16(1), pp.71–122.

Patt, A. et al., 2009. Making index insurance attractive to farmers. *Mitigation and Adaptation Strategies for Global Change*, 14(8), pp.737–753.

Raschky, P. a. et al., 2012. Uncertainty of Governmental Relief and the Crowding out of Flood Insurance. *Environmental and Resource Economics*, 54(2), pp.179–200.

Raschky, P.A. & Schwindt, M., 2011. *Aid, Catastrophes and the Samaritan's Dilemma*, Melbourne: Monash University.

Reynaud, A. & Nguyen, M.-H., 2012. *Monetary Valuation of Flood Insurance in Vietnam*, Hanoi, Ho Chi Minh City: Vietnam Center of Research in Economics, Management and Environment 01-2012.

Schechter, L., 2007. Traditional trust measurement and the risk confound: An experiment in rural Paraguay. *Journal of Economic Behavior & Organization*, 62(2), pp.272–292.

Skees, J.R., 2008. Innovations in Index Insurance for the Poor in Lower Income Countries. *Agricultural and Resource Economics Review*, 1(37), pp.1–15.

Surminski, S. & Oramas-Dorta, D., 2011. *Building effective and sustainable risk transfer initiatives in low- and middle-income economies: what can we learn from existing insurance schemes?*, London: Centre for Climate Change Economics and Policy, Grantham Research Institute on Climate Change and the Environment.

Surminski, S. & Oramas-Dorta, D., 2014. Flood insurance schemes and climate adaptation in developing countries. *International Journal of Disaster Risk Reduction*, 7, pp.154–164.

Turner, G., Said, F. & Afzal, U., 2014. Microinsurance Demand After a Rare Flood Event: Evidence From a Field Experiment in Pakistan. *The Geneva Papers on Risk and Insurance Issues and Practice*, 39(2), pp.201–223.

Viverita, R., Setiati, R. & Abdurrahman, I.A.A.F., 2010. *A Study on Demand for micro insurance for low-income households in Disaster-Prone Areas of Indonesia*, Depok: Universitas Indonesia.

WHO, 2012. *How to Conduct a Discrete Choice Experiment for Health Workforce Recruitment and*

Retention in Remote and Rural Areas: A User Guide with Case Studies, Geneva.

World Bank, 2014. World Development Indicators. *World Development Indicators*. Available at: http://databank.worldbank.org/ [Accessed August 15, 2014].

Appendix

1

	Insurance A	Insurance B	No Insurance
Cover for loss	1,000,000 Riel	500,000 Riel	–
Weekly premium	2,000 Riel	2,000 Riel	–
Condition for pay-out	Pay-out after a visit of insurance employee	Pay-out if measuring station has shown flood	–
Credit	without loan	without loan	–
Prevention	No prevention	Prevention effort	–
Provider	Village	National government	–

1

	Insurance A	Insurance B	No Insurance
ទំហំនៃការបង់ខាត	1,000,000 រៀល	500,000 រៀល	–
ប្រាក់បង់ជូនក្រុមហ៊ុនប្រចាំសប្តាស៍	2,000 រៀល	2,000 រៀល	–
លក្ខ័ណ្ឌវិនិច្ឆ័យក្នុងការបង់ខាត	វាយតម្លៃទំហំខូចខាតមុនធ្វើការបង់ខាត	បង់ខាតជូនក្រោពីក្រសួងប្រកាសមុនអំពីទឹកជំនន់	–
ឥណទាន	គ្មានឥណទាន	គ្មានឥណទាន	–
ការបង្ការ និងការពារនូវគ្រោះមហន្តរាយ	ពុំចាំបាច់ការពារ និងបង្ការ	ចាំបាច់ការពារ និងបង្ការ	–
អ្នកផ្តល់សេវាធានារ៉ាប់រង	អ្នកផ្តល់សេវាក្នុងភូមិ	រដ្ឋាភិបាល	–