



**CLIMATE RISK
INSURANCE AND
INFORMAL-RISK SHARING**
A Critical Literature Appraisal

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Climate risk insurance and informal-risk sharing

A Critical Literature Appraisal

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1. Introduction

In the face of predicted increasing weather extremes, the need to support the most vulnerable people and countries in finding effective strategies to manage risks and unexpected shocks and to build resilience to climate impacts is greater than ever. Insurance can be one tool to help people manage risk more effectively. Alongside other tools, it plays an important role in a comprehensive risk management strategy. Increasingly local and national governments are using climate risk insurance to protect themselves and their population against natural disasters. Meanwhile, climate risk insurance (CRI) is an integral part of many political agendas, reflected particularly in the trendsetting InsuResilience Global Partnership and the UNFCCC climate negotiations around the topic of Loss and Damage.

However, it is often overlooked that many of the potential low-income target groups of climate risk insurance are not economically independent but have already developed strategies to deal with the potential impacts of extreme weather events and prevent potential damage. Inter alia, they are engaged in the sharing of risk through informal risk-sharing arrangements (IRSA). This paper therefore deals with the questions: Can informal risk-sharing arrangements and climate risk insurance work complementary? If yes, how? Can they compensate for mutual weakness and make communities more resilient to climate change impacts? Or do climate risk insurance schemes undermine the benefits of informal risk sharing arrangements?

To answer these questions, we will conduct a critical literature review, covering the topics IRSA, CRI as well as studies on the relationship of both. A special focus lies on the literature on the resilience building impact of IRSA and CRI tools because they provide a useful basis by which to measure the effectiveness of the combination of both tools. In the literature review, we take three steps: the first step is to look at IRSA in detail. The aim is to answer the following questions: 1) How have communities traditionally managed their risks and what role do IRSA play? 2) How can IRSA strengthen the resilience of communities? 3) What are the advantages and disadvantages of using IRSA? In the second step, this paper strives to answer the following questions for CRI: 1) What is CRI and which role does it play in a comprehensive risk management strategy? 2) How can CRI strengthen the resilience of communities? 3) What are the advantages and disadvantages of using CRI? By answering these questions for both, IRSA and CRI instruments, the foundation is laid for the third step in which the possibility and probability of how both instruments can work complementary to make communities more resilient to climate change impacts is analyzed.

The approach of this paper is not to present CRI as a remedy for the inadequacies of IRSA. Rather, to look at the strength and challenges of both instruments and analyze if and how they can compensate for mutual weakness in order to build the resilience of communities.

2. Informal risk sharing arrangements in the face of changing risk profiles

2.1 Informal risk-sharing as part of traditional approaches to climate risk management

Indigenous people and local communities have always observed, interpreted and responded to meteorological phenomena and changes in the climate, such as weather patterns or the behavior of certain animal species (UNESCO. 2017, Dube, E. & Munsaka, E. 2018). Based on their local and indigenous knowledge, they developed strategies to deal with the potential impacts of extreme weather events and prevent potential damage. These traditional coping strategies were often constantly developed over long time following deep-seated cultural risk awareness and show evidence of early climate risk management approaches (Ngwese, M.N. et al. 2018). Traditional climate risk management can be understood as risk management strategies that have been developed in response to the limiting conditions of varying climate and weather patterns by farmers and communities and are based on local and indigenous knowledge. In contrast with the international knowledge system generated through a network of universities and other research institutions (also called contemporary knowledge), indigenous knowledge has been defined as “local knowledge that is unique to a given culture or society (Warren, D. M. 1995, Stigter, C. J. et al. 2005).”

To deal with natural hazards and preventing them from becoming disasters, several strategies and measures were developed which can be taken up before, during and after an event. These measures and strategies can be assigned to all different phases of the risk management cycle (Table 1).

Table 1 Traditional climate risk management measures applied to the five phases of the Disaster Risk Management Cycle

Risk Management Phase	Type of Measure	Traditional Disaster Risk Management
Risk Prevention	Physical Barriers	Traditional dykes
	Natural Protection Constructions	Use of natural surroundings to build homes on raised floor, low height and surrounded by highly protective windbreaks. Trees and shrubby plants cultivated for wind protection, erosion control and habitat restoration. Embankments, polderization, coastal afforestation and shelterbelts, construction of shelter-house
	Migration	Shifting of farming locations due to changing precipitation patterns.
	Preservation	Local crop preservation techniques as a hedge against possible drought or other conditions of food shortage
	Adapted Housing	Traditional houses from local, lightweight but strong materials to absorb torrential rains, yield superficially to the high winds of typhoons and withstand the shaking of earthquakes
Risk Retention and Transfer (Informal)	Traditional Seed Sharing	Sharing of seeds for greater diversity to reduce risk
	Exclusive Risk Sharing	Traditional risk sharing arrangements of families or ethnic groups
	Social relationships	Social relationships according to the principle: work together in daily live helps to work together during a disaster
Preparedness	Traditional Meteorological (and nature) Observation Methods	Observation of weather patterns and clouds, behavior of certain animal species and changes on certain types of trees and other naturally occurring indicators to predict floods, droughts and other harsh conditions
	Preparation Measures	Clean, repair and strengthen irrigation channels and sea dykes prior to start of annual cyclone season
	Traditional Knowledge	Storytelling, rituals and other methods of transferring local knowledge to build awareness
	Hazard Observation	Inventions like a simple seismograph that indicated the direction of the epicenter and measured the force of earthquakes
Response	Consumption and asset smoothing Migration	Short term food saving strategies, selling of productive assets (e.g. livestock), migration (within community)
Recovery	Informal Support	Mutual aid (e.g. for rebuilding) within community

The table shows that traditional forms of risk management are diverse and cover all phases of the risk management cycle. Next is the focus on informal risk-sharing arrangements.

In the absence of formal social safety nets or insurance mechanisms, households and communities in many developing countries depend on their own, potentially costly, strategies for income and consumption smoothing and the strength of their informal risk sharing networks to manage risk they face (Binswanger, H., & Rosenzweig, M. 1993, Ligon, E. et al. 2002). Informal risk sharing mechanisms allow for risks and potential losses and damages to be distributed among several participants of a community. Indeed, in rural and poor communities such informal arrangements that allow group members to share the risk among themselves are a prevailing strategy to reduce risk (Gurven, M. et al. 2015, Dercon, S. & Krishnan, P. 2000, Fafchamps, M. & Gubert, F. 2007, Ligon, E. et al. 2002, Rosenzweig, M. R. & Wolpin, K. I. 1993) Rather than involving formal contracts, such arrangements often rely on reciprocal exchange and trust demanding strong social networks – representing social capital (Gurven, M. et al. 2015). The idea of social capital is that social networks are valuable items (Bourdieu). They define the relationships between the members of a community that shape their behavior. Moreover, these networks provide a basis for “social cohesion because they enable people to cooperate with one another – and not just with people they know directly – for mutual advantage” (Habtom, G. K., & Ruys, P. 2007). The tighter these networks are, the more likely it is that members of a community will work together for mutual advantage.

Social networks can take on a variety of forms. According to Habtom & Ruys (2007) they can be:

- Simplex (single-issue or one dimension) or multiplex (comprehensive or several dimension)
- Horizontal (networks among similar social and economic groups) or vertical (network with different formal sector society);
- Formal (impersonal relations with defined contract) or informal (social interaction without explicit agreement);
- Egocentric (when the ultimate motive for social interactions is individual benefit) or exocentric (when the ultimate motive for social interactions is to realize collective benefit);
- Mobilized (when external formal institutions are established to organize and guide the operations and activities of the network) or voluntarily (when the social network is formed).
- In many local and traditional communities, social networks are the basis for traditional risk-sharing arrangements. As formal safety nets are often absent, communities use their social capital to reduce unexpected social costs (Habtom, G. K., & Ruys, P. 2007). IRSA can take on a variety of forms and differ with regard to the form of compensation, scale and binding character.

First, these self-help schemes can take on different scales, i.e. they can be based on the extended family, semi-formal groups or formal groups within a community, such as neighborhood associations, self-help associations, castes or cooperatives, or encompass even a whole community (e.g. clan or tribal associations). Often though, they do not exceed the community level.

Second, they may differ in the type of compensation. In case of a shock, the group members may provide the affected persons inter alia with gifts, recapitalization or loans, as well as with the provision of labor or employment (Takahashi, K. et al. 2017, Dercon, S. et al. 2014, Boucher, S., & Delpierre, M. 2017).

Third, the arrangements may be implicit or explicit, i.e. have clearly defined rules and agreements or are based merely on traditions and expectations.

IRSA are very diverse and context specific. To get a better understanding of how these arrangements work in reality, the following boxes present two examples of IRSA in India and Ethiopia.

Box 1: Caste-based risk sharing in India

One example for traditional risk sharing networks are the sub-castes or *jati* in India. They are a century-old institution (Mobarak, A. M. & Rosenzweig, M. 2012). This kind of risk sharing arrangement exists in almost all major states of India (Mobarak, A. M. & Rosenzweig, M. 2012). Evidence suggests that the majority of loans and transfers are provided by fellow caste members. Interestingly, though “the majority of informal loans and financial transfers to households from family and from fellow caste members originate outside the village. *Jati* networks span villages and districts in India, and the spatial correlation in rainfall falls sharply as distance increases [...]. *Jatis* therefore have the potential to indemnify aggregate (village-level) rainfall risk in addition to household-specific idiosyncratic risk.” (Mobarak, A. M. & Rosenzweig, M. 2012)

This is especially interesting as usually informal or traditional risk sharing arrangements are expected not to exceed a certain scale, e.g. village level. If risk-sharing arrangements only exist within a community or village, this constitutes a major disadvantage in comparison to formal insurance solutions as aggregate shocks, i.e. those that affect a big part or all of the members of the community, may not be buffered. Despite this potential advantage, it is to note that the Indian (sub-) caste system itself may be highly egalitarian within one caste, but in turn, highly exclusionary to people outside of it.

Box 2: Traditional Risk Sharing Arrangements in Ethiopia

In Ethiopia so-called *iddirs* are a widespread form of informal risk sharing arrangements present in both rural and urban Ethiopia. Though often misleadingly referred to as mere funeral societies, *iddirs* are associations that work as informal insurances against a multitude of other risks like food shortage, medical expenses or death of major productive assets like draft oxen. “An *iddir* is an association of, typically, 50-200 individuals who are connected by ties of family, friendship, geographical area, occupation or ethnic group” (Berg, E. et al., 2017). They provide mutual aid and financial assistance to affected people in the case of an emergency situation (Mauri, A. 1987). The frequency of contributions, i.e. payments, vary between different types of *iddirs*. In some *iddirs* contributions are only made in the occurrence of a shock. Hence, contributions are collected from members and paid directly to the person in need. In a study sample of *iddir* members, Berg, Blake and Morsink found that a great majority of 84 per cent of members to an *iddir* only contributed in the case of a shock. In such an arrangement, comparatively high payments are made at one point in time (post-disaster) as opposed to smaller, segregated payments distributed across a period of time (pre-disaster). This of course provides members with more financial flexibility but makes payouts less reliable. Furthermore, if several members or even a great part of the *iddir* is affected by a shock at the same time, the arrangement may not be able to fully address the needs of those damaged. Other types of *iddirs* collect regular monthly payments just like an insurance premium, which is then saved in a communal fund. Other *iddirs* are a mix of both, combining small monthly payments with ad-hoc contributions when a shock occurs (Berg, E. et al. 2017). “In rural areas most *iddirs* operate on the basis of social sanctions and cultural norms, while in urban areas they function mainly on the basis of written by-laws framed by the general assembly of all members.”

Iddirs also seem to be characterized by inclusiveness. Although a survey amongst 1,033 farm households in Ethiopia suggests that very poor households are less likely to form part of an *iddir* (however, 71 % reported to be a member), there is no evidence that the poorest are excluded from mutual support networks (Viganò L. et al. 2007). “In fact it is not uncommon to hear of cases where the very poor are exempted from requirements of paying to *iddir*, and yet maintain their rights similar to those who regularly contribute.” A survey among 1,300 farm households in a coffee-growing area in Ethiopia suggests that the poor are even more likely to receive a payment than the very rich. Also, women received payouts more often than men. This shows the existing willingness for solidarity among members of informal insurance schemes and may correspond with the functioning of contributory social protection schemes. *Iddirs* have furthermore shown a high degree of permanency and sustainability, which may be explained due to their capacity of adapting to

changing circumstances and coming up with innovative features. For instance, *iddirs* did show an increased tendency towards formalization and came up with the provision of new and more diverse services (e.g. the provision of credit or renting out halls, tents and other facilities) when facing new circumstances and a changing environment. Furthermore, new, diverse and fast expanding types other than community-based ones have come up. Some *iddirs* have even increasingly shown efforts in community development (Dejene, A. 1999). Nonetheless, stability of *iddirs* has been threatened in recent decades as rural communities and their members have to face an increasing uncertainty about the frequency and severity of shock. This is, and was, partly due to macroeconomic and institutional instability as well as accelerating climate change. Furthermore, looking at the climate change stability of *iddirs* – which usually only exist within one community – they will likely have troubles with shocks that affect the whole or great parts of the community.

2.2 Strength and challenges of informal risk-sharing arrangements regarding resilience building

Besides the variety in IRSA in all of the above-mentioned dimensions, community approaches often exhibit certain distinct features that bring with them both strength as well as challenges. Next, this paper will look at these strengths and weaknesses with regard to their influence on the IRSA resilience building ability. For this report we understand the term resilience as “the ability to anticipate, avoid, plan for, cope with, recover from and adapt to shocks and stresses” (ODI. 2015). With their 3As approach, the Overseas Development Institute breaks down resilience into the three clearly distinctive categories of anticipation, absorption and adaptation, which will be used for this report. Assuming measures that increase the capacity of individuals to anticipate, absorb and adapt will simultaneously increase their resilience, this paper will use these 3As as determinants of resilience. The definitions are as follows:

Resilience Capacities		
Anticipate	Absorb	Adapt
Ability to estimate the impact of weather events on individuals and countries and the response measures and costs required to adequately address the impacts.	Ability to cope with the impacts of an extreme weather event and absorb the effects of the event.	Ability to adjust to actual or expected extreme weather events and their effects. Adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.

Source: Schaefer, L., & Waters, E. 2017.

Resilience in this context refers to the ability of indigenous and local communities to resist natural hazards by building anticipative, absorptive and adaptive capacities (Gaillard 2007).

Context-specific

Naturally, such community-based schemes have a close connection to the people within the communities. Hence, they can draw upon local knowledge and existing ties between members including trust. They may furthermore be able to rely on a better understanding of needs, capacities and gaps (Hillier, D. 2018). Understanding the local conditions of potential risks and occurring shocks may also allow for a more integrated strategy, i.e. encompassing all of the 3As. Rooted in the local context mechanisms for risk assessment, risk buffering and risk prevention may suit the needs of the community and its people.

Transaction costs

Due to the proximity of the different members of the group, information is almost symmetric.^a For informal risk sharing mechanisms, for instance, this means that it is easier to determine the risk and impacts of a certain shock to a group member or household as well as the resulting needs. Hence, information problems that may result in moral hazard or adverse selection^b are comparatively small (Besley, T. 1995), which likely decreases the potential of fraud. Also, as people are part of the same community, they repeatedly interact with each other, which is known to improve credibility and commitment of the involved parties (Besley, T. 1995). However in systemic disaster situations, informal risk sharing based on this strong trust could lead to dependencies of poorer households on help from other community members. If the limited combined ability to deal with the disaster is overstressed without other safety nets in place, the poorest would then suffer the most.

^a Information symmetry is defined as a condition in which all relevant information is known to all parties involved. Reversely, information is said to be asymmetric when one party to a transaction possess more relevant knowledge than the other.

^b For both the problems of moral hazard and adverse selection asymmetric information plays a role – but at different times of the arrangement. In the case of adverse selection there is asymmetric information *prior* to an arrangement or contract between two parties (for instance between a buyer and a seller who knows about the deficiencies of the product). Moral hazard occurs if one party provides misleading information and changes its behaviour towards the risks it is taking as it knows that through an arrangement between the two parties it is protected against the risk. The other party will then have to come up for the potential costs. This is a typical problem to insurance contracts.

Affordability and flexibility

Informal risk sharing activities as part of TCRM are often affordable to the members of the community as costs and efforts are usually shared. For any member or household within the community, the 'premium', that is, the cost for protection against risks, is often just the mere promise to provide help to others in the case of a shock.^c If based on mere promises, this makes such informal risk sharing arrangements inexpensive and flexible (for instance, no need to pay premiums prior to the occurrence of a loss event and no administrative costs). This suits especially the needs of the poor, who otherwise do not have access to formal or private forms of insurance due to financial liquidity constraints and a resulting inability to pay premiums prior to the occurrence of an extreme event.

Horizontal expansion

Another feature of TCRM is its usually limited group size and the corresponding personal network and social relationships. Community-based efforts depend on a strong and stable social network that is ideally characterized by mutual trust and reciprocity. Group members are often familiar with one another. If the aforementioned features would not apply, problems of moral hazard, adverse selection and organizational difficulties might arise. The community members must trust each other to share reliable information in order to safeguard the whole community. Similarly, trust is needed for adaptation mechanisms that involve protecting nature and refraining from exploiting it (e.g. forests or mangroves as described above). The relationships may function as a social collateral safeguarding the payments for ex ante insurance premiums or ex-post disaster aid in the case of a shock. Additionally, harsher climate conditions can cause long-term migration of community members, migrating into cities for work. This can lead to decreasing ties of these members to their community, lowering trust and therefore weakening informal risk sharing systems.

Reliance on traditional values and structures

Closely related to the factor of group size and personal ties, is the importance of certain values such as trust, reciprocity and equality (Gurven, M. et al. 2015, Charness, G. & Gernicot, G. 2009). The less formal the arrangements, the greater the reliance on such shared values may be. Nonetheless, the

^c Nonetheless, it should be noted, that this is not always the case and depends heavily on the design of the mechanism as for some arrangements regular ex-ante payments have to be made. In such cases reduced premiums for especially poor group members may be in place though, which again make such schemes more egalitarian, e.g. in the case of *iddirs* in Ethiopia where very poor women have to pay a reduced premium.³ The Ethiopian model of *iddirs* will be described in the next section.

existence of traditional and community-based arrangements should not be equivocally ascribed to altruism or egalitarian principles only. Economic incentives and self-interest as innate preferences may equally constitute reasons for the generation of risk sharing agreements. Gender income inequalities and other inner community discrepancies can promote or guard informal risk insurance. One example is the varying degree of risk aversion of men and women. According to Charness and Genicot (2009) there is a greater tendency of women to be risk averse. Informal risk sharing does not necessarily contribute to more inclusiveness, but can preserve these structures. Nevertheless, examples like the *iddirs* in Ethiopia, or community based self-help groups empowering women to transform gender relations, can be the answer to such challenges.

Coverage of risks

Though communities have known how to deal with climate-related risks for a long time, their abilities to cope with these risks are limited. Traditional risk sharing arrangements were developed to cope with less severe and idiosyncratic events, i.e. events that only affected a small number of group members. They are therefore limited to or even incapable of covering the risk if a whole community or group is affected. This may impact the sustainability of informal risk sharing mechanisms in two dimensions. Firstly, the more severe and frequent the impacts of an extreme weather event, the more it will cost the group to cope with the outcomes of a shock. Secondly, the impacts of climate change may affect communities rather on the aggregate level. Whereas sharing works reasonably well for pooling the risk of individual-specific shocks, it may not work well for more severe shocks on the aggregate level (Berg, E. et al. 2017). Without reciprocal support or outside aid, disasters (caused by systemic risk) can lead to a 'cycle of poverty', as victims take out high-interest loans (or default on existing loans), sell assets and livestock or engage in low-risk, low-yield farming to lessen their exposure to extreme events [...]. "Even though the IRSA do not protect against aggregate shocks, evidence suggests that they do allow for consumption-smoothing of idiosyncratic shocks (Dercon, S., & Krishnan, P. 2000, Duflo, E., & Udry, C. 2004).

Climate change impact

Increasingly frequent extreme weather events can push the arrangements to their capacity limits. The more severe and frequent the impacts of an extreme weather event, the more it will cost the group to cope with the outcomes of a shock. As they are often non-formalized arrangements, the poorest members of a community may no longer be secured. Moreover, harsher climate conditions can cause long-term migration of community members, migrating into cities for work. This can lead

to decreasing ties of these members to their community, lowering trust and therefore weakening informal risk sharing systems

Based on the above explanations, the strengths and challenges of IRSA with regard to resilience building are summarized in the following table.

Table 2: Strength and challenges of IRSA regarding resilience building

Informal risk-sharing arrangements		
Resilience capacities	Strength	Challenges
Absorb and adapt	<ul style="list-style-type: none"> Adapted to local conditions: Local knowledge of environmental (climate) conditions, understanding of needs, capacities and gaps. Based on many years of experience and traditional knowledge. Suitable for idiosyncratic risks affecting a small number of individuals at a time Low transaction costs: Low transaction costs: easier to determine the risk and impacts of a certain shock to a group member or household as well as the resulting needs Trust: Emphasis on values like trust and reciprocity. Strong relationships and extensive information sharing in often small communities lowers risk of fraud Affordability: Flexible and affordable also for the poorest members of the community (Well established in communities although, often only mere promise to provide help in case of disaster) 	<ul style="list-style-type: none"> Suitability: Traditional coping strategies are often only suitable for “familiar” and idiosyncratic natural events Traditional values and structures: Not necessarily more inclusive, may manifest and strengthen existing power structure Limited coverage of risks: unable to deal with systemic risks that affect the whole community. Put under stress by climate change: increasingly frequent extreme weather events can push the arrangements to their capacity limits. The more severe and frequent the impacts of an extreme weather event, the more it will cost the group to cope with the outcomes of a shock. As they are often non-formalized arrangements, the poorest members of a community may no longer be secured. Migration: harsher climate conditions can cause long-term migration of community members, migrating into cities for work. This can lead to decreasing ties of these members to their community, lowering trust and therefore weakening informal risk sharing systems

3. Climate risk insurance

The last chapter dealt with the current literature on IRSA and took a closer look at the strength and weaknesses of IRSA. This chapter will closely examine CRI approaches: how do they work? What is their role in a comprehensive risk management approach? What are their strength and weaknesses and how can they support communities in building resilience?

3.1 Climate risk insurance as part of comprehensive climate risk management

Climate risk insurance is understood as “insurance products that cover losses caused by extreme weather events, which are intensified and increased in frequency by climate change” (Schaefer, L., & Waters, E. 2017) on an individual, community, national or regional level. In general, insurance works by replacing “the uncertain prospect of losses with the certainty of making small, regular premium payments” (Churchill, C. 2006).

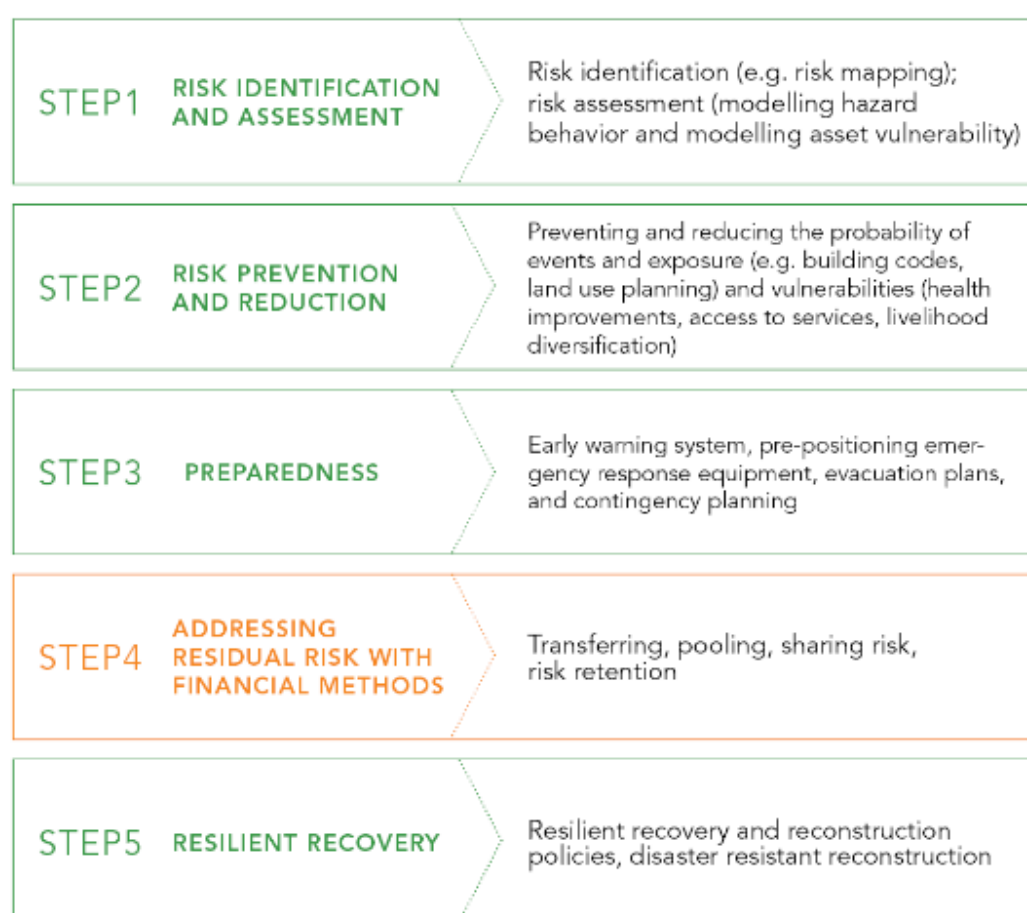
Climate risk insurance schemes may be both direct and indirect: Direct insurance approaches are those in which the insured benefits directly from transferring risk to a risk-taking entity (such as an insurer). In the event the insurance agreement is triggered, the insured beneficiary receives the insurance payout (direct transfer). Indirect insurance approaches are those where the final intended target group benefits indirectly from payments intermediated by an insured government, or from being a member of an institution that has insurance (Schaefer, L., & Waters, E. 2017).

Climate risk insurance can be implemented at three levels: Micro level (direct): Policyholders are individuals, e.g. farmers, market vendors or fishers. Meso level (indirect): Policyholders are risk aggregators such as associations, cooperatives, mutuals, credit unions or NGOs, whereby a (re)insurer makes payments to the risk aggregators, which then provide services to individuals. Macro level (indirect): Policies are held by governments or other national agencies, within the international/regional reinsurance market. Beneficiaries of these programmes can be individuals. These schemes can be operationalized through regional risk pools (Schaefer, L., & Waters, E. 2017).

The type of insurance most frequently used for CRI is index insurance. Index insurance is a form of insurance in which payouts are paid directly after an index has been triggered by exceeding a predefined threshold. Index insurance can be designed as a weather-based, satellite-based or yield-

based product, referring to the trigger used to determine the insurance payout (Schaefer, L., & Waters, E. 2017). As this is the most common type, this paper will focus its analysis on index insurances.

Transferring risks in a cost-efficient way through insurance or other tools is a key financial approach for addressing residual risk – but is only one step in a systematic process. To enable climate-resilient development, effective risk management should involve a portfolio of actions aimed at improving the understanding of disaster risks, to reduce and transfer risk and to respond to events and disasters, as well as measures to continually improve disaster preparedness, response and recovery – as opposed to a singular focus on any one action or type of action (IPCC, 2012, p. 35). The figure below highlights the key steps in a comprehensive risk management approach (Schaefer, L., & Waters, E. 2017).



Source: Schaefer/Waters (2017) based on World Bank (2015c) (Schaefer, L., & Waters, E. 2017, World Bank. 2015c).

3.2 Strength and challenges of climate risk insurance regarding resilience building

Applying a mix of qualitative scientific methods, researchers from MCII analyzed 18 already existing climate risk insurance schemes with regard to their impact on resilience. The study showed that insurance can contribute to increasing these key capacities in four ways, both ex-ante and ex-post, namely by providing timely finance after disaster, increase investment security and support risk assessment and reduction.

Timely finance after a disaster

By providing timely funding to improve financial liquidity shortly after a disaster, insurance can play a role as a safety net and buffer for people and countries shortly after an event. Compared to other post-disaster financing options (such as aid, loans and family assistance), insurance can be more timely and reliable as the insured clients have a “right” to a post-disaster payout. Index-based insurance is particularly quick, as it does not require lengthy loss adjustments as precondition for payouts (Microsave. 2013). Studies have shown that the earlier relief arrives after a shock, the greater its effectiveness in cushioning adverse welfare impacts, avoiding the distress sale of assets and speeding up recovery (Berg, E., Blake, M., & Morsink, K. 2017).

Timely and reliable disbursements enable households to secure their livelihoods in the event of a disaster. Insurance “payouts can be set up to occur as soon as the loss-causing event is detected, which helps smallholder farmers stabilize their incomes and recover more quickly from climate-related shocks” Greatrex, H. et al. 2015). This way, insurance can act as a safety net that prevents people from using harmful coping strategies and slipping into poverty or falling deeper into poverty. Timely funding after a disaster can help individuals cover losses and damages, stabilize their income, buy food and other necessities, and avoid costly financial loss, ultimately enabling people to choose alternative means to cope with negative shocks (Carter, M. R., & Barrett, C. B. 2006, Skees, J. R., & Collier, B. 2008).

However, there are examples where CRI could not provide a safety net and buffer immediately after an event. For the 2015/16 agricultural season, the Government of Malawi purchased a drought insurance policy from the African Risk Capacity (ARC). When Malawi then experienced a severe drought, a payout from ARC was not automatically triggered. This was due to the ARC model indicating a low number of people affected by the drought. However, the Government’s estimate of the impacted population in Malawi was much higher, suggesting a discrepancy in the results of the

model (African Risk Capacity. 2016). ARC investigated the discrepancy by examining the performance of the model and fieldwork. They found that farmers in Malawi had switched “to a greater extent to growing a different type of crop than that assumed in the model. Farmers shifted in recent years to planting maize with a 90-day growing period, compared to the maize variety with a growing period of 120-140 days as assumed in the customization of Malawi’s model. The rainfall pattern in 2015/16 was particularly unfavorable to the shorter cycle maize, such that correcting this crop assumption in the model resulted in a very different modelled outcome” (African Risk Capacity. 2016). When ARC corrected the crop assumption in the model, a payout was triggered. ARC then proceeded a payout of approx. US\$ 8.1 million (African Risk Capacity. 2016). However, the payout was only made in January 2017 (the declaration of emergency happened in April 2016) and hence neither improved financial liquidity shortly after the disaster nor provided a safety net and buffer for people shortly after an event.

This example highlights the importance of appropriate and realistic assumptions for customizing models for index CRI. Having the best-available and current data is a key challenge for index CRI.

Reduce the financial impact of volatility and provide greater certainty in decision-making

By reducing the residual risk that has not been reduced by measures already taken, insurance can help mitigate the financial impact of volatility and help people adapt to climate change in the long term. It creates an area of security where investments, planning and development activities can be carried out. Thereby, insurance can incentivize “positive risk taking” (Hallegatte, S. et al. 2016), which is essential for innovation and growth. At the micro level, it can help to create opportunities and contribute more investment in activities with higher returns and better creditworthiness, which could enable people or small and medium-sized enterprises to escape the poverty trap or the threat it poses.

Catalyzing risk assessment

Insurance can act as a catalyst for risk assessment. Risk assessment is an important part of insurance as it is a prerequisite for calculating the premium level for policyholders. Accordingly, insurance can facilitate regional and international data analysis, such as the definition of data standards, methods and storage, and thus act as a catalyst for risk assessment. Assessing the risk of loss and damage is a prerequisite for identifying needs and policy priorities. Additionally, “public awareness of risk can have a major effect in reducing the impacts of extreme weather events: risk

awareness encourages risk-reducing behavior and increases the demand for insurance coverage” (Warner, K. et al. 2012).

Incentivizing risk reduction behavior

Insurance can promote risk reduction behavior e.g. by making it a prerequisite for reducing premiums or by enabling people to work for their insurance cover by participating in projects identified by the community to reduce risk and increase climate resilience. In this way, insurance can help prevent losses and damage. However, few existing systems show an operational link between risk transfer and risk mitigation (Surminski, S., & Oramas-Dorta, D. 2011). In addition, it could help municipalities to redesign risk management in the long term. This will be done by making a more structured decision around the ex-ante risk. At the political level, we note that the requirement for emergency planning as an admission criterion for insurance companies has changed the disaster relief process in the relevant countries. In this way, insurance can encourage countries to develop a culture of data-driven, prevention-focused risk management. Elabed and Carter (2014) as well as Karlan et al. (2014) moreover note that insurance products encourage the use of strategies that build future resilience (Elabed, G., & Carter, M. R. 2014, Karlan, D. et al. 2014).

As the authors note themselves, the study and its methods should be treated as points of departure for further research into climate risk insurance for the poor. The analyzed insurance schemes are relatively new interventions and only a few impact assessment evaluations have been performed to assess their viability. The result therefore represents a snapshot which must be supplemented and updated by further results. In particular, the possible challenges and negative impacts of CRI must also be considered - a few of the points are listed in the following sections.

Direct CRI is not a cost-efficient solution for the poorest of the poor

Insurance instruments are important tools for transferring and pooling risks, although they are not always the most cost-effective approach. High transaction costs and high premium prices are the main obstacles responsible for low insurance penetration in developing countries, and they are responsible for many systems that do not reach scale. Evidence suggests that direct CRI is not a cost-effective solution to address climate risks for the poorest of the poor. Researchers found that for households with capital above but near the critical asset threshold, “the probability of collapse to a low level equilibrium increases with the introduction of insurance since the premium payments reduce the ability to create growth” (Kovacevic, R. M., & Pflug, G. C. 2011) and opportunity costs are too high (Janzen, S. A. et al. 2013). When premiums have to be covered by beneficiaries, insurance

can exacerbate inequality as only the wealthier can afford the premiums, hence often only wealthy and very wealthy members of a community purchase (Murphy, D. J. 2011, Bertram-Huemmer, V., & Kraehnert, K. 2017).

Insurance is not an appropriate measure for all kinds of risks

It should be stressed that insurance is not a panacea for all types of damage caused by climate change. Insurance options can be viable instruments to address the risk of extreme weather conditions. However, they are not suitable for slow and predictable events or processes that occur with a high degree of certainty (slow-onset events). Even for catastrophic weather-related events that occur very frequently, such as recurrent floods, insurance would be an unreasonable solution (MCII. 2016). Building resilience and avoiding losses and damage in such cases can be alternative cost-effective ways to address these risks.

Insurance cannot cover all losses

Insurance only covers a certain percentage of the damage, and even if insurance policies exist, the basic risk may result in farmers being less protected than they expected. Basis risk can be understood as the risk that insurance claims do not adequately reflect the losses incurred; in other words, an individual suffers a loss and does not receive a payment for it because the insurance threshold was not triggered. It can arise from a discrepancy between the index-related weather measurements (for instance of rainfall) at a given weather station and the actual losses of the insured. The risk most often originates from either poor contract design or discrepancies that arise from the distance between the location of the index measurement point and the insured field. This can lead to both an advantageous outcome for the farmer (i.e. a payment even though the farmer did not experience a loss) or it can mean that even though a farmer experiences a loss, she or he will receive little to no payment for covering the damage. In the latter case, the farmer has to deal with the extra costs by themselves. In this situation, the tool decreases wealth in states where policy holders are already vulnerable. When offered as an individual product, climate risk insurance may therefore be too risky for many poor, and more interesting for wealthier members of a community (Clarke, D. J. 2011).

Rising prices and uninsurable risks

As climate change will increase the intensity and frequency of extreme weather events, some of the risks may become so severe that they are no longer insurable. Increased risk for other currently

insurable threats such as crops and animals will lead to higher premiums, which might make the product ultimately too expensive for the poor, and the actors who subsidize premiums for the poor.

Another risk is that of increasing premiums. As they are “likely to increase in tandem with climatic risks [...] once farmers have adopted modern practices under protections offered by index insurance, they may find that they can no longer afford such protections, when they most need them.”

New Risks: Creating Dependencies

Another potential challenge mentioned in the literature is the creation of **new dependencies** for smallholder farmers **on commercial inputs**. Insurance is often bundled with other products like hybrid seeds or fertilizers. Once farmers start to use these products, often dependencies on commercial retailers are created as it is harder for farmers to switch back to traditional fertilizers and seeds as these “[...] seeds typically do not reproduce the desired traits in the second generation and thus cannot be saved from one season to the next” (Müller, B. et al. 2017). If due to the introduction of new hybrid seeds, traditional anticipative strategies for diversity like sharing seeds and seed banks (see also section 1.1.1) eroded, Müller, Johnson and Kreuer argue, farmers could become even more vulnerable. “If the collective maintenance of such practices is weakened, farmers (or the donors and governments who support them) could become especially vulnerable to rising insurance premiums or future termination of coverage in regions where insurers deem losses to be unsustainable.” (Müller, B. et al. 2017)

Based on the above explanations, the strengths and challenges of CRI with regard to resilience building are summarized in the following table. This paper focuses particularly on the capacities of “absorb” and “adapt” as they correspond with the identified IRSA strength and weaknesses.

Table 3: Strength and challenges of CRI regarding resilience building

(Index) Climate Risk Insurance

Resilience Capacities	Strength	Challenges
Absorb	<ul style="list-style-type: none"> • Immediate payout as safety net after a shock that might support a community when TCRM instruments come to their limits. • Increased financial liquidity helps to better absorb shocks – people may not have to resort to coping strategies that might impede sustainable development (e.g. consumption smoothing) – • Based on the timely finance, insurance allows more effective risk-coping strategies to be taken 	<ul style="list-style-type: none"> • Best- available data for appropriate and realistic assumptions for customizing models can be challenging as the Malawi example shows. When data is not available/incorrect, timely finance is not provided. • Cost efficiency: insurance is not a cost-efficient solution to deal with climate risks for the poorest of the poor • Cannot cover all losses + basis risk: only covers a certain percentage of the damage, and even if insurance policies exist, the basic risk may result in farmers being less protected than they expected • Not appropriate for all sort of risks: insurance is not appropriate or generally feasible for slowly developing and foreseeable events or processes that happen with high certainty • Rising prices and uninsurable risks: As climate change will increase the intensity and frequency of extreme weather events, some of the risks may become so severe that they are no longer insurable
Adapt	<ul style="list-style-type: none"> • Space of certainty for investments, planning and development activities can be undertaken – as certainty is there that a specified amount of money will come in case of disaster • Incentivize risk reduction behavior by premium price or contingency plan – might help shape new way to deal with risk and reduce risk 	<ul style="list-style-type: none"> • The space of certainty might make people take more risk that they can bear. Basis risks limits the “space of certainty” • Few existing systems show an operational link between risk transfer and risk mitigation

4. Combining informal risk-sharing arrangements and climate risk insurance

The two previous chapters have examined in detail IRSA and (Index) CRI instruments. The instruments were explained and their strength and challenges regarding resilience building was analyzed. Thus the foundation for the third step has been laid – next this paper will address the following questions: Can IRSA and CRI work complementary? If yes, how? Can they compensate for mutual weakness and make communities more resilient to climate change impacts? Or do climate risk insurance schemes undermine the benefits of informal risk sharing arrangements?

4.1 Potential Synergies and Benefits

A safety net with several floors – Covering different types of risks

Evidence from the literature and analysis in chapters 2 and 3 suggests that CRI and IRSA can work complementary to form a safety net with several floors by covering different types of risks.

Chapters 2 and 3 showed that CRI and IRSA cover different types of risks. While index CRI is best suited to mitigate covariate shocks that tend to affect all households in a village simultaneously, IRSA can mitigate idiosyncratic risks that are relatively independent across households in the village. Combining IRSA and CRI therefore offers an opportunity to address different types of risk, i.e. risks on both the aggregate and the idiosyncratic level. “In theory at least, formal and informal insurance can complement and operate alongside one another – they may address different risks and provide different benefits.” In this way, CRI can offer timely and reliable post-disaster finance as the insured clients have a “right” to a payout when the trigger is hit. Timely and reliable disbursements enable households to secure their livelihoods in the event of a disaster and prevent people from using harmful coping strategies and slipping into poverty, or falling deeper into poverty.

IRSA, on the other hand, can bring in traditional and highly context-specific knowledge from the communities and may be a way to better manage basis risk – as not all basis risk is perfectly allocated among all members or a group. It has been suggested that IRSA could buffer this

remaining risk. Formal insurance and more traditional informal mechanisms could then work as complements.

We find the following evidence:

- Mobarak and Rosenzweig (2012) examined the interaction between informal risk sharing, index insurance and risk-taking (Mobarak, A. M., & Rosenzweig, M. R. 2012). They randomized rainfall insurance contracts offered to cultivating and landless households in a set of Indian villages for a social network – the sub-caste (or jati). They could show that informal risk sharing and index insurance can be complements when there is basis risk, because the jati network will cover household losses precisely when the index contract fails. They conclude that “Jati-based risk-sharing may directly substitute for formal insurance, but the relationship is actually more complex because informal net-works can potentially help mitigate an imperfection of index insurance called “basis risk”—the imperfect correlation between rainfall measured at the weather stations and farmers’ actual losses randomly place weather stations in some of the project villages. This allows us to explore whether basis risk deters index insurance purchase, and the extent to which informal risk sharing that indemnifies household-specific losses mitigates this effect” (Mobarak, A. M., & Rosenzweig, M. R. 2012).
- Boucher and Delpierre (2014) develop a theoretical model that explores how the introduction of a formal index insurance market may affect farmers risk taking behavior and the degree of risk sharing in existing IRSA. They suggest that “insofar as basis risk is not perfectly correlated amongst different individuals in the IRSA, it has the potential to be smoothed through the IRSA”.

This of course does not mean that communities can buffer all kinds of basis risk. For instance such risks that affect the whole community at the same time and are not insured against or for situations in which loss and damages occur that are theoretically insured against, but due to poor contract design or unfitting determination of the threshold no payouts are triggered. Smart and context specific contract design is thus still of utmost importance.

Choosing the right scale

For a successful integration of formal insurance with traditional risk management strategies, especially informal risk sharing^d, choosing the right scale is important. This means choosing whether to have contracts where the individual is the policy holder or where one person or organization serves as a risk aggregator. A community-based organization or a cooperative could for instance be a risk aggregator that would take out insurance, pay the premium and distribute potential pay out on behalf of the group or community. Note, that not only communities or community-based organizations can work as risk aggregators, i.e. policy holders, in meso-level insurance arrangements. Micro finance institutions, non-governmental organizations or cooperatives may work as risk aggregators, too. Offering such group contracts could overcome some of the problems that are common to other indemnity or index-based insurance products, especially the often experienced lack of financial literacy, i.e. the limited understanding of the insurance product, the lack of (individualized) distribution channels, trust.

If a community member, such as a community leader or a community-based organization works as an intermediary, problems of trust could be tackled. As an organization or person that is known and respected by the members, people might be more open towards the insurance. Providing training to the risk aggregators might therefore be of special importance. Knowing their communities or members best, they could not only help ‘translating’ the functioning of the insurance product into the local context and thereby improving insurance literacy amongst the group, they could also function as a valuable intermediary between the insurer and the group, channeling their feedback and complaints. Being able to tackle these problems of trust and even insurance literacy, with so called meso-level insurance (see box 3) it may also be easier scaling up insurance products than with those offered to individuals (Hillier, D. 2018).

Box 3: Meso-Level Climate Risk Insurance

So far climate risk insurance has mainly been operationalized on the micro-level, where individuals function as policy holders, or on the macro level, where usually the state is the policy holder.

On the meso-level a so-called risk aggregator functions as the policy holder, who is paying the premiums and in case of an event is getting the pay-out. Such risk aggregators can be inter alia micro finance institutions, cooperatives, communities or other community-based organizations.

^d See also discussion on potential crowding-out effects of insurance in chapter 3.1.2.

Basically two models of climate risk insurance on the meso-level exist: The target group, which is usually made up of farmers, benefit either directly or indirectly (depending on the design and type of risk aggregator) from the insurance.

Indirectly: The risk aggregator is, for example, a microfinance institution and secures its portfolio for microloans to small farmers. In the case of an extreme weather event, the credit defaults of the risk aggregator are hedged; small-scale farmers benefit indirectly.

Directly: If the risk aggregator is a community-based organization or cooperative, the payments are passed on to the farmers concerned; small-scale farmers benefit directly.

Chances:

- Community-oriented
- building on existing networks & distribution channels
- Up-scaling might be easier

Risks:

- People who are not part of these existing networks could be excluded, a danger particularly to the poorest and most vulnerable

4.2 Potential problems and challenges

Does CRI crowd out IRSA?

The introduction of formal climate risk insurance to rural communities with existing informal sharing arrangements, poses the question of the effect they have on the latter. Several studies (Takahashi, K. et al. 2017, Dercon, S. et al. 2014, Boucher, S., & Delpierre, M. 2014) have examined whether the availability of formal insurance crowds out informal arrangements, i.e. whether people transfer less or are less willing to help each other out in times of crisis. However, research does not give us clear answers to this yet. The research generally suggests the following findings on individually purchased insurance:

- Formal indemnity insurance does indeed tend to crowd out informal risk sharing mechanisms. Studies found that individual indemnity insurance can reduce informal risk-sharing, and that the introduction of informal risk-sharing can crowd out demand for individual indemnity insurance (Arnott, R., & Stiglitz, J. E. 1991).

- Formal index-based insurance can potentially work very well as a complementary to informal risk sharing arrangements. “All else held constant, such complementarity should increase an informally insured individual’s willingness to pay for index insurance while index insurance uptake should likewise reinforce informal risk pooling arrangements.” Though *theoretically* index-based insurance might as well crowd out informal arrangements^e, empirical evidence from Ethiopia and India (Berg, E. et al. 2017) suggest otherwise: Rather than crowding-out informal transfers it may even crowd it in, i.e. make people more willing (and maybe even more able) to help each other.
- However, Boucher and Delpierre (2014) found that when risk-taking is not contractible by members of the IRSA, the introduction of formal index insurance to individuals will reduce informal risk sharing (crowding out) and can also, under conditions laid out, reduce risk taking and welfare. The adverse welfare impact of index-insurance is reversed if the index insurance contract is instead offered at the group level.

Case studies from different parts of the world show an extended picture:

- Berg, Blake and Morsink (2017) for instance studied the impact of informal risk sharing of Ethiopian *iddirs* (see box 2 for more information on *iddirs*) on both indemnity insurance and index insurance. In artefactual field experiments with farmers in Ethiopia, they were able to show that “risk sharing decreases the number of units of indemnity insurance purchased by 27 per cent and increases the number of units of index insurance by 130 per cent.” (Berg, E. et al. 2017) The authors explain this phenomenon due the extent of risk sharing: The greater it is, the higher the agent’s need to be insured against shocks that are common to the group. In combination with traditional risk sharing arrangements these could be covered better by index insurance, whereas shocks specific to the individual would be better covered by indemnity insurance (Berg, E. et al. 2017).^f

^e It should be noticed though that Boucher and Delpierre (2014) argue, index-based insurance might crowd out informal arrangements if these informal arrangements suffer from *moral hazard* in the first place. But as has been described in section 1.2 especially problems like moral hazard are comparatively low in informal risk sharing arrangements due to typically close ties and small group sizes. As an empirical study by Jain (2016) in Kenya suggests, the closer the social ties between persons, the more willing they are to engage in risk sharing even if efforts cannot be monitored. These findings together with those of Boucher and Delpierre (2014) may suggest that informal arrangements only work until a certain group size, with strong community cohesion and little dispersion of group members. If the group gets too big or social connections are weak and hence problems of moral hazard, monitoring and trust arise, formal arrangements may be more suitable. Especially as IBIs do not face the problem of moral hazard. (Mobarak, A. M. & Rosenzweig, M. 2012)

^f “Intuitively, indemnity insurance and risk sharing are substitutes because both serve the purpose of smoothing consumption within the group, that is, protecting against idiosyncratic shocks. And index

- Takahashi, Barret and Ikegami (2017) conducted another study in Ethiopia, considering the introduction of a formal livestock index insurance and its influence on pastoralist communities where informal risk sharing arrangements called *dabare* were in place. Their results suggest that “randomly matched peer’s insurance uptake positively influences respondents’ willingness to make informal transfers to that match. By contrast, respondents’ own formal insurance uptake has no significant effect on risk sharing through customary institutions.” The overall findings suggest that index insurance in this context may even crowd in informal risk sharing behaviour. This is consistent with the work of Mobarak and Rosenzweig (2013) in India showing that “members of castes that share idiosyncratic risk become much more likely to purchase index insurance than do members of castes that do not share risk.”
- The work of Dercon et al. undertaken in Ethiopia hints in a similar direction. The authors attempted to market weather insurance products to existing informal risk-sharing groups. Their research finds that emphasizing informal risk sharing may be beneficial for the uptake of insurance. The authors suggest that offering index insurance for groups may overcome some of the problems with low uptake that indemnity and index insurance products usually face. When group leaders function as an intermediary and are offered training, they can improve understanding and trust, which are usually common problems for insurance uptake.

Although evidence suggests that formal index-based insurance can potentially work very well as a complementary to informal risk sharing arrangements and does not crowd out IRSA, we have to note that some of the evidence is based on theoretical experiments. To get more clarity on this question, further evidence is needed. One way to get there would be to include the “crowding out” question in impact evaluations of CRI products.

Climate change impact

The analyses in chapter 2 and 3 showed that both, CRI and IRSA are put under stress by climate change. For IRSA, increasingly frequent extreme weather events can push the arrangements to their capacity limits. The more severe and frequent the impacts of an extreme weather event, the more it will cost the group to cope with the outcomes of a shock. As they are often non-formalized arrangements, the poorest members of a community may no longer be secured. Moreover, harsher

insurance and risk sharing are complements because the greater the extent of risk sharing, the more the residual risk relates to the aggregate shock, which is covered by index insurance.” (Berg, E. et al. 2017)

climate conditions can cause long-term migration of community members, migrating into cities for work. This can lead to decreasing ties of these members to their community, lowering trust and therefore weakening informal risk sharing systems

For CRI, some risks may become so severe that they are no longer insurable, as climate change will increase the intensity and frequency of extreme weather events. Increased risk for other currently insurable threats, such as crops and animals, will lead to higher premiums, which might make the product ultimately too expensive for the poor and the actors who subsidize premiums for the poor.

This means, to support people in developing countries in dealing with the consequences of climate change, it is also essential to ramp up existing mitigation commitments and action to prevent dangerous climate change impacts.

4.3 Important framework conditions and principles in combining climate risk insurance with informal risk-sharing arrangements

CRI as part of a comprehensive risk management strategy

Transferring risks in a cost-efficient way through insurance or other tools is a key financial instrument to address residual risk – but is only one step in a systematic process. To enable climate-resilient development, effective risk management should involve a portfolio of actions aimed at improving the understanding of disaster risks, to reduce and transfer risk and to respond to events and disasters as well as measures to continually improve disaster preparedness, response and recovery – as opposed to a singular focus on only one action or type of action (IPCC. 2012).

There are different layers of risk that risk management measures need to respond to. An efficient risk management scheme involves assigning an instrument or set of instruments to each layer, consistent with the selected strategy (reduction, retention or transfer). Financial instruments, in combination with risk prevention and reduction measures, should be selected on the basis of frequency and severity of disasters. This suggests that for weather-related risks which happen often (high frequency) but which are less serious (low severity), preventative and risk reduction activities may be the most cost-effective. The more severe and less frequent risks could be transferred to private and public insurance markets

Pro-poor principles

In targeting and reaching most vulnerable people and communities with CRI instruments, Pro-Poor Principles for Climate Risk Insurance should be applied.

The InsuResilience Partnership has Pro-Poor Principles that can help with guiding the design and implementation process of new insurance schemes that benefit the poor and vulnerable (InsuResilience Secretariat 2019). The principles are⁹:

1. Impact - Create positive and lasting change for poor and vulnerable people
2. Quality - Implement adequate and high quality climate and disaster risk finance and insurance solutions that address the needs of poor and vulnerable people
3. Ownership - Ensure demand-driven approaches through environments that are conducive to stakeholder action, with a focus on the agency of end users
4. Complementarity - Develop a mix of synergistic climate and disaster risk finance and insurance solutions building from existing institutional frameworks
5. Equity - Climate and disaster risk finance and insurance solutions should provide inclusive and targeted support to promote equitable growth

Human-rights based approach to CRI

The Pro-Poor Principles need an ethical framework so that they can be fully effective. Such a framework can be a human-rights based approach to CRI. It can serve as a measure of how principles such as ownership or equity are operationalized and how impact is defined.

To pursue a human rights-based approach to climate risk insurance basically means two things: fostering and promoting human rights as the *objective* of the climate risk insurance scheme and making sure that the process of implementing such a scheme is in line with human rights standards itself (Hutfls. 2018). Four pillars (see also figure 1) have been identified that are important for guaranteeing a process that fosters and promotes the human rights of the beneficiaries:

(1) Non-discrimination and active inclusion of marginalized groups: As discussed before, a critical assessment of this is important in the context of traditional climate risk management

⁹ More information on the principles and their sub-principles can be found at:

https://www.insuresilience.org/wp-content/uploads/2019/06/insuresilience_propoor_190529-2.pdf.

arrangements. It may be the case that not all community members can equally partake in traditional risk sharing arrangements. When introducing an insurance product, it must be made sure that all community members in case of a shock receive a payout on an equal basis.

(2) Participation and empowerment of those affected: Linking traditional climate risk management arrangements with climate risk insurance can enhance ownership of the beneficiaries and as such make it more sustainable as communities and their needs are at the center of this approach.

(3) Transparency, accountability and mechanisms for complaint: As with every sort of climate risk insurance arrangement (whether it be on the micro, meso or macro level) transparency of how payments are triggered and made is of utmost importance for the acceptance of the instrument, as well as having accountability and complaint mechanisms in place. For group contracts, this is true in two ways: There must be transparency of contract rights and responsibilities between insurance company and the risk aggregator as well as for the relationship between risk aggregator and the individuals within the group.



Figure 1: Principles of a human rights-based approach to climate risk insurance and insurance-related instruments (Hutflits. 2018)

(4) Respect towards and building on existing structures in the country or region. The last point is especially important in this context. In order to promote the empowerment of the beneficiaries, a thorough assessment of existing structures, as well as investigating the needs and wants of the community before the set-up of an insurance scheme is important. The careful integration of

traditional CRM with CRI may allow for a beneficial and complementary reinforcement of both approaches.

5. Conclusions

It is often overlooked that many of the potential low-income target groups of climate risk insurance are not economically independent but have already developed strategies to deal with the potential impacts of extreme weather events and prevent potential damage. Inter alia, they are engaged in the sharing of risk through IRSA. The aim of this paper was to conduct a critical literature review on the questions: Can informal risk-sharing arrangements and climate risk insurance work complementarily? If yes, how? Can they compensate for mutual weakness and make communities more resilient to climate change impacts? Or do climate risk insurance schemes undermine the benefits of informal risk sharing arrangements?

The analysis suggests that IRSA and CRI insurance can indeed work in a complementary fashion by forming a safety net with several floors by covering different types of risks. While index CRI is best suited to mitigate covariate shocks that tend to affect all households in a village simultaneously, IRSA can mitigate idiosyncratic risks that are relatively independent across households in the village.

Combining IRSA and CRI therefore offers an opportunity to address different types of risk, i.e. risks on both the aggregate and the idiosyncratic level. In this way, CRI can offer timely and reliable post-disaster finance as the insured clients have a “right” to a payout when the trigger is hit. Timely and reliable disbursements enable households to secure their livelihoods in the event of a disaster and prevent people from using harmful coping strategies and slipping into poverty or falling deeper into poverty. IRSA, on the other hand, can bring in traditional and highly context-specific knowledge from the communities and may be a way to better manage basis risk – as not all basis risk is perfectly allocated among all individuals of IRSA.

This paper furthermore highlights that combining CRI and IRSA only works when CRI is designed carefully with view to the needs of most vulnerable people. Therefore, it is especially important to apply a pro poor and human rights-based to climate risk insurance and integrate it in a holistic climate and disaster risk management strategy. Nonetheless, it is crucial to be aware that there is no one-size-fits-all solution to a successful integration as the existing community structures as well as the local needs may differ from case to case.

Although evidence suggests that formal index-based insurance can potentially work very well as a complement to IRSA and does not crowd out IRSA, it must be noted that some of the evidence is based on theoretical experiments. To get more clarity on this question, further evidence on the following questions is needed: What happens to IRSA/community solidarity systems when an insurance product is introduced? Do wealthier members bail out of the IRSA or do they use the insurance payout as safety net to then support poorer members of the community? Can IRSA smooth basis risk and is basis risk in fact often not perfectly correlated amongst different individuals of the IRSA? What are the framework conditions for IRSA and CRI to work in a complementary manner? What is the difference between indemnity-based and index-based CRI concerning the crowding out effect? One way to answer these questions would be to include them in impact evaluations of CRI products.

The analysis also showed that both, CRI and IRSA are put under stress by climate change. Climate change can put IRSA arrangements to their capacity limits, and thus the poorest members of a community may no longer be secured. For CRI, some risk may become so severe that premium prices rise significantly or the risks are no longer insurable. This means, to support people in developing countries in dealing with the consequences of climate change it is essential to ramp up existing mitigation commitments and action to prevent dangerous climate change impacts.

References

African Risk Capacity (2016): PRESS RELEASE – Malawi to receive USD 8M insurance payout to support drought-affected families. Available at:

<https://www.africanriskcapacity.org/2016/11/14/press-release-malawi-to-receive-usd-8m-insurance-payout-to-support-drought-affected-families/>.

African Risk Capacity (2016): PRESS RELEASE – Malawi to receive USD 8M insurance payout to support drought-affected families. Available at:

<https://www.africanriskcapacity.org/2016/11/14/press-release-malawi-to-receive-usd-8m-insurance-payout-to-support-drought-affected-families/>.

African Risk Capacity (2016): PRESS RELEASE – Malawi to receive USD 8M insurance payout to support drought-affected families. Available at:

<https://www.africanriskcapacity.org/2016/11/14/press-release-malawi-to-receive-usd-8m-insurance-payout-to-support-drought-affected-families/>.

Arnott, R., & Stiglitz, J. E. (1991). Moral hazard and nonmarket institutions: Dysfunctional crowding out of peer monitoring?. *The American Economic Review*, 179-190.

Berg, E., Blake, M., & Morsink, K. (2017). *Risk Sharing and the Demand for Insurance: Theory and Experimental Evidence from Ethiopia*, Oxford: Centre for the Study of African Economies. Retrieved from <https://www.csae.ox.ac.uk/materials/papers/csae-wps-2017-01-2.pdf>.

Berg, E., Blake, M., & Morsink, K. (2017). *Risk Sharing and the Demand for Insurance: Theory and Experimental Evidence from Ethiopia*, Oxford: Centre for the Study of African Economies. Retrieved from <https://www.csae.ox.ac.uk/materials/papers/csae-wps-2017-01-2.pdf>.

Bertram-Huemmer, V., & Kraehnert, K. (2017). Does index insurance help households recover from disaster? Evidence from IBLI Mongolia. *American Journal of Agricultural Economics*, 100(1), 145-171.

Besley, T. (1995). "Nonmarket institutions for credit and risk sharing in low-income countries", *Journal of Economic Perspectives*, Vol 9 (3), pp. 115-127. Retrieved from <https://www.aeaweb.org/articles?id=10.1257/jep.9.3.115>.

Binswanger, H., & Rosenzweig, M. (1993). Wealth, weather risk and the composition and profitability of agricultural investments. *Economic Journal*, 103(416), 56-78.

Boucher, S., & Delpierre, M. (2014). The Impact of Index-Based Insurance on Informal Risk-Sharing Arrangement, *CEPS/INSTEAD Working Paper 2014-13*. Retrieved from https://www.liser.lu/publi_viewer.cfm?tmp=3783.

Carter, M. R., & Barrett, C. B. (2006). The economics of poverty traps and persistent poverty: An asset-based approach. *The Journal of Development Studies*, 42(2), 178-199.

- Charness, G., & Genicot, G. (2009). "Informal risk sharing in an infinite-horizon experiment", *The Economic Journal*, Vol 119 (537), pp. 796-825. Retrieved from <https://academic.oup.com/ej/article/119/537/796/5089562>.
- Churchill, C. (2006). Protecting the poor: A microinsurance compendium. International Labour Organization. Available from <http://www.munichre-foundation.org/dms/MRS/Documents/ProtectingthepoorAmicroinsurancecompendiumFullBook.pdf>.
- Clarke, D. J. (2011). A theory of rational demand for index insurance. *Economics Series Working Papers*, 572.
- Dejene, A. (1999). "The Village Economy and Indigenous Financial Institutions: Theory and Evidence from Rural Ethiopia", in Demeke, M. & Amha, W. (eds.), *Economics of Integrated Crop and Livestock Systems in Ethiopia*. Addis Ababa: Agricultural Economics Society of Ethiopia.
- Dercon, S. & Krishnan, P. (2000). "Vulnerability, seasonality and poverty in Ethiopia", *Journal of Development Studies*, Vol 36 (6), pp. 25-53.
- Dercon, S., & Krishnan, P. (2000). In sickness and in health: Risk sharing within households in rural Ethiopia. *Journal of political Economy*, 108(4), 688-727.
- Dercon, S., Hill, R. V., Clarke, D., Outes-Leon, I., & Taffesse, A. S. (2014). "Offering rainfall insurance to informal insurance groups: Evidence from a field experiment in Ethiopia", *Journal of Development Economics*, Vol 106, pp. 132-143.
- Dube, E. & Munsaka, E. (2018). "The contribution of indigenous knowledge to disaster risk reduction activities in Zimbabwe: A big call to practitioners", *Jàmbá: Journal of Disaster Risk Studies*, Vol 10(1). Retrieved from <https://doi.org/10.4102/jamba.v10i1.493>.
- Duflo, E., & Udry, C. (2004). Intrahousehold resource allocation in Cote d'Ivoire: Social norms, separate accounts and consumption choices (No. w10498). National Bureau of Economic Research.
- Elabed, G., & Carter, M. R. (2014). Ex-ante impacts of agricultural insurance: Evidence from a field experiment in Mali. University of California at Davis.
- Fafchamps, M. & Gubert, F. (2007). "Risk Sharing and Network Formation", *American Economic Review*, Vol 97 (2), pp. 75-79. Retrieved from <https://www.aeaweb.org/articles?id=10.1257/aer.97.2.75>.
- Greatrex, H., Hansen, J., Garvin, S., Diro, R., Le Guen, M., Blakeley, S., ... & Osgood, D. (2015). Scaling up index insurance for smallholder farmers: Recent evidence and insights. CCAFS Report No. 14 Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available from <https://cgspace.cgiar.org/rest/bitstreams/38716/retrieve>.
- Gurven, M., Jaeggi, A. V., von Rueden, C., Hooper, P. L., & Kaplan, H. (2015). "Does market integration buffer risk, erode traditional sharing practices and increase inequality? A test among

- Bolivian forager-farmers", *Human ecology*, Vol 43(4), pp. 515-530. Retrieved from <https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC4624453&blobtype=pdf>.
- Habtom, G. K., & Ruys, P. (2007). Traditional risk-sharing arrangements and informal social insurance in Eritrea. *Health policy*, 80(1), 218-235.
- Hallegatte, S., Bangalore, M., & Jouanjean, M. A. (2016). Higher losses and slower development in the absence of disaster risk management investments. The World Bank.
- Hillier, D. (2018). *Facing Risk: Options and challenges in ensuring that climate/disaster risk finance and insurance deliver for poor people*. Oxford: Oxfam GB.
- Hutflitsch (2018). *A Human Rights-based Approach towards Climate Risk Insurance. Making Insurance-related Instruments for Climate Risk Management Beneficial to the Poor and Vulnerable*. Bonn: Germanwatch.
- IPCC (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation – Special Report of the Intergovernmental Panel on Climate Change*. New York: Cambridge University Press. Available from <http://www.ipcc-wg2.gov/SREX/>.
- Janzen, S. A., Carter, M. R., & Ikegami, M. (2013). Valuing asset insurance in the presence of poverty traps. UC-Davis working paper.
- Karlan, D., Osei, R., Osei-Akoto, I., & Udry, C. (2014). Agricultural decisions after relaxing credit and risk constraints. *The Quarterly Journal of Economics*, 129(2), 597-652.
- Kovacevic, R. M., & Pflug, G. C. (2011). Does insurance help to escape the poverty trap?—A ruin theoretic approach. *Journal of Risk and Insurance*, 78(4), 1003-1028.
- Ligon, E., Thomas, J. P., & Worrall, T. (2002). "Informal insurance arrangements with limited commitment: Theory and evidence from village economies", *The Review of Economic Studies*, Vol 69 (1), pp. 209-244. Retrieved from <http://www.econ.nyu.edu/user/debraj/Courses/Readings/LigonThomasWorrallRES.pdf>.
- Ligon, E., Thomas, J. P., & Worrall, T. (2002). Informal insurance arrangements with limited commitment: Theory and evidence from village economies. *The Review of Economic Studies*, 69(1), 209-244.
- Mauri, A. (1987). "The Role of Financial Intermediation in the Mobilisation and Allocation of Household Savings in Ethiopia: Interlinks Between Organized and Informal Circuits", *SSRN Electronic Journal*.
- MCII (2016a). Best practices, challenges and lessons learned from insurance-related solutions that address the risk of loss and damage associated with the adverse effects of climate change. Submission to the Executive Committee of the Warsaw International Mechanism on Loss and Damage. 10 March 2016. Available from https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/mcii_submission_to_the_excom_of_the_wim_10-march-2016.pdf

- Microsave (2013). Towards De-risking Disasters: Taking stock of microinsurance for disaster risk reduction – Index based microinsurance in South and South East Asia. Available from http://www.microsave.net/files/pdf/Microinsurance_Towards_De_Risking_Disasters_MicroSave.pdf
- Mobarak, A. M. & Rosenzweig, M. (2012): "Selling formal insurance to the informally insured", *Yale University Economic Growth Center Discussion Paper No. 1007*. New Haven: Economic Growth Center.
- Mobarak, A. M. & Rosenzweig, M. (2013). *Effects of Informal Risk Sharing and Rainfall Insurance on Risk Choices*. Working Paper, Yale University.
- Mobarak, A. M., & Rosenzweig, M. R. (2012). Selling formal insurance to the informally insured. Unpublished.
- Müller, B., Johnson, L., & Kreuer, D. (2017). "Maladaptive outcomes of climate insurance in agriculture", *Global Environmental Change*, Vol 46, pp. 23-33.
- Murphy, D. J. (2011). Going on otor: Disaster, mobility, and the political ecology of vulnerability in Uguumur, Mongolia.
- Ngwese, M.N., Saito, O., Sato, A., Boafo, A.Y., & Jasaw, G. (2018). Traditional and Local Knowledge Practices for Disaster Risk Reduction in Northern Ghana. *Sustainability*, 10(3), 825. Available at: https://collections.unu.edu/eserv/UNU:6456/n2018-03_MacNight_sustainability-10-00825.pdf.
- ODI (2015). Climate extremes and resilient poverty reduction: development designed with uncertainty in mind. London: Overseas Development Institute. Available from <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/10130.pdf>.
- Rosenzweig, M. R. & Wolpin, K. I. (1993). "Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investments in Bullocks in India", *Journal of Political Economy*, Vol 101 (2), pp. 223-244.
- Schaefer, L., & Waters, E. (2017). Climate Risk Insurance For The Poor & Vulnerable: How To Effectively Implement The Pro-Poor Focus Of Insuresilience An analysis of good practice, literature and expert interviews. Munich Climate Insurance Initiative. Available at: http://www.climate-insurance.org/fileadmin/mcii/documents/MCII_2016_CRI_for_the_Poor_and_Vulnerable_full_study_lo-res.pdf.
- Skees, J. R., & Collier, B. (2008). The potential of weather index insurance for spurring a green revolution in Africa. Working paper, GlobalAgRisk, Inc. Lexington, Kentucky. Available from <https://www.uky.edu/Ag/AgEcon/pubs/resWeatherAGRAo4.pdf>.
- Stigter, C. J., Dawei, Z., Onyewotu, L. O. Z., & Xurong, M. (2005). "Using traditional methods and indigenous technologies for coping with climate variability", *Climatic Change*, Vol 70 (1-2), pp. 255-271.
- 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?

Takahashi, K., Barrett, C. B., & Ikegami, M. (2017). "Does index insurance crowd in or crowd out informal risk sharing? Evidence from rural Ethiopia", *American Journal of Agricultural Economics*. Retrieved from <http://barrett.dyson.cornell.edu/files/papers/Takahashi%20et%20al.%20revised%200924,%202017.pdf>.

UNESCO (2017). *Local Knowledge, Global Goals*. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000259599>.

Viganò L., Dejene, A., Bonomo, L. and Wondwossen, T. (2007). *Risk Management Financial Innovations and Institutional Development in Rural Areas: Evidence from the Coffee Sector in Ethiopia*, Bergamo: Bergamo University Press.

Warner, K., Kreft, S., Zissener, M., Höppe, P., Bals, C., Loster, T., ... & Young, S. (2012). Insurance solutions in the context of climate change-related loss and damage. UNU-EHS.

Warren, D. M., Slikkerveer, L. J., & Brokensha, D. (eds.) (1995). *The Cultural Dimension of Development: Indigenous Knowledge Systems*. London: Intermediate Technology Publications.

World Bank (2015c). Regional Risk Pooling Mechanisms for Managing Catastrophic Risks. Available from http://mddb.apec.org/Documents/2015/FMP/SEM1/15_fmp_sem1_o18.pdf.



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The Munich Climate Insurance Initiative was initiated as a charitable organization by insurers, research institutes and NGOs in April 2005 in response to the growing realization that insurance solutions can play a role in adaptation to climate change, as suggested in the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. This initiative is hosted at the United Nations University Institute for Environment and Human Security (UNU-EHS). It is focused on bringing solutions for the risks posed by climate change to poor and vulnerable people in developing countries. MCII provides a forum and gathering place for insurance-related expertise applied to climate change issues.

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