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Climate change and weather risk management: evidence from index-based insurance schemes in China and Ethiopia

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1. Introduction

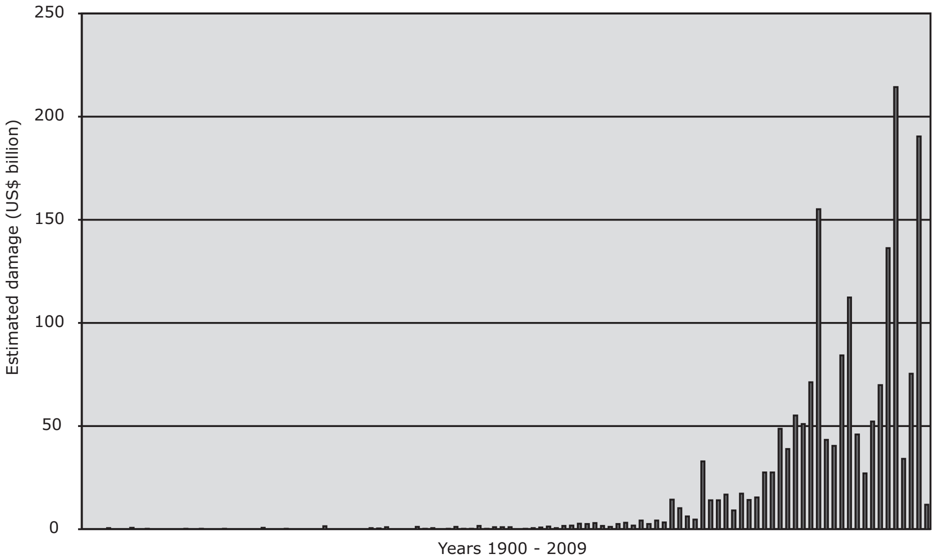
This chapter introduces and reviews WFP's weather index-based insurance pilot schemes at both the macro and micro levels in Ethiopia and China. It argues that although index insurance is not a "one-size-fits-all" solution for risk management, it can – when combined with existing disaster risk reduction projects – make important, market-based contributions to sustainable safety nets and agricultural growth in the rural areas of developing countries. In collaboration with insurance companies, governments and agencies such as WFP can play crucial roles in enabling and facilitating the start up of such insurance interventions.

The chapter first explains why managing risk rather than managing crisis has become an integral part of WFP's climate change and disaster risk work. It then explores the possibilities for using weather index-based insurance to manage agricultural risks, along with the limitations. This is followed by descriptions of WFP's experience of index-based insurance approaches at the local and national levels in Ethiopia and China. Good practices for success are identified and briefly discussed before preliminary conclusions regarding the sustainability and scalability of index-based risk transfer mechanisms in WFP's work are examined.

2. Weather related disasters threaten food security

Gains in development are at increasing risk from a variety of threats, including climate change-induced disasters (WFP, 2009g), which can exacerbate poverty, especially in the developing world (Dercon, 2004; Hansen *et al.*, 2004). For example, the intensity, amount, frequency and type of precipitation are tending to result in more frequent catastrophic events such as droughts, floods and tropical storms. Ecosystem degradation, chronic poverty and unplanned urbanization underpin this growing risk of devastating disasters. By 2030, these looming risks are forecast to cause average losses of about 12 percent[1] of developing countries' gross domestic products (GDPs), but cost-effective risk reduction measures could reduce this figure by more than 50 percent (ClimateWorks Foundation *et al.*, 2009).

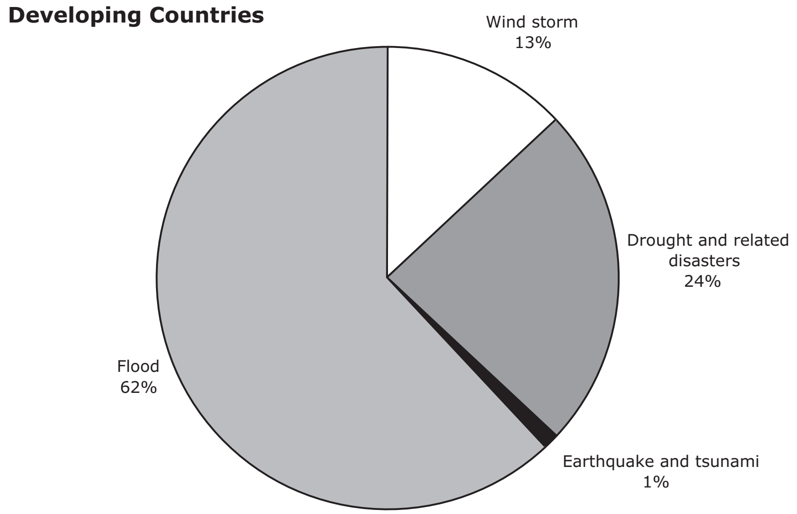
Figure 8.1 Estimated damage caused by reported natural disasters, 1900 to 2008



Note: Excluding technological disasters, i.e., those caused by neither weather nor natural forces, although these may be contributing factors.
Source: EM-DAT: OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels. www.emdat.be.

Changing weather patterns are undermining the resilience of poorer communities worldwide. Where there are no functioning safety nets to help them absorb loss and recover from disaster impacts, these people often adopt negative coping strategies that aggravate climate risk exposure. The combination of increasing hazard risk and decreasing resilience constitute one of the major causes of food insecurity and hunger in poorer communities (UNISDR, 2009).

Figure 8.2 Percentages of people affected by disasters, 1991–2005



Source: EM-DAT: OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels. www.emdat.be.

As illustrated in Figure 8.2, between 1991 and 2005, 85 percent of all the people affected by natural disasters recorded in developing countries suffered the effects of drought or flood.[2]

Among the population groups with increased vulnerability to droughts and floods are smallholder farmers and day labourers. As well as the impacts of a changing climate, they face a variety of market and production risks that make their incomes unstable and unpredictable throughout the year and from one year to the next. Farmers also face the risk of catastrophe: crops may be destroyed by drought or pest outbreaks; product prices may plummet because of adjustments in local or world markets; and assets and lives may be lost to hurricanes, fires and floods. The types and severity of the risks confronting farmers vary by farming system, agro-climatic region, and policy and institutional setting, and they are particularly burdensome to small-scale farmers in the developing world. When not adequately managed, agricultural risks slow economic development and poverty reduction, and contribute to humanitarian crises.

For many decades, risk transfer mechanisms such as insurance schemes have been used to manage risk by transferring it to third parties with more stable financial bases. Historically, this has enabled economic growth, and it is now also being considered as a tool for risk management and risk reduction in developing countries. The Hyogo Framework for Action[3] and the Bali Action Plan[4] clearly spell out that "risk sharing and transfer mechanisms such as insurance" are an important element in "disaster reduction strategies and means to address loss and damage associated with climate change impacts in the developing countries that are particularly vulnerable to the adverse effects of climate change" (UNISDR, 2005: 11).

3. Agricultural risk and weather index insurance

A review of the risks arising in agriculture, and of the ways in which they are managed by farmers, rural communities, financial institutions, farm input suppliers, private insurers and relief agencies, reveals the special difficulties and costs that covariate risks pose, especially those involving catastrophic losses. Past attempts by governments and relief agencies to assist the management of covariate risks have been costly and often ineffective. There is now much interest in index insurance[5] products that might provide a more effective and market-mediated solution (Hess and Hazell, 2009).

Weather index insurance is designed to trigger compensation against specific hazards such as droughts or floods, which are predefined and "indexed". Typically, these insurance contracts are non-indemnity and parametric, i.e., they are not linked to actual losses.[6] Rather than assessing the damage to a crop, claims are settled on the basis of a simple and transparent index, such as rainfall measured at a nearby weather station. Experience has revealed that this can be a valuable tool for unlocking rural credit and hence improving rural livelihoods.[7]

In contexts involving rural smallholder farmers, weather index products have distinct advantages over traditional crop insurance: by using the same index and premium rate for everybody in an area, they avoid adverse selection and moral hazard problems; the mechanism is simple, transparent and easy to administer, especially when weather stations are automated; and payouts are triggered immediately and usually reach insurees within a few weeks of the end of the contract (World Bank, 2005b: 15 ff).

There is a fundamental distinction between *protection* insurance, which is designed to help poor people protect their livelihoods and assets, and *promotion* or *development* insurance, which is designed to help households with viable farm businesses manage their risks.

Insurance that *protects* lives and assets from catastrophic losses inevitably has to be subsidized, and requires special delivery channels that should be aligned with relief rather than development interventions, for example, non-governmental organizations (NGOs) and public relief agencies.

Insurance that *promotes* agricultural development can be channelled through private intermediaries, but is unlikely to sell unless it is subsidized or promotes farmers' access to new productivity enhancing technologies or high-value markets that can raise their incomes significantly. There are many opportunities for this in developing countries, where risk and incomplete financial markets hinder small farmers' access to financial markets, modern inputs and high-value market chains (Hess and Hazell, 2009).

As well as benefiting farmers directly at the micro level, index insurance products can also act at the meso and macro levels (Table 8.1).

Table 8.1 Levels of weather index insurance for agriculture

Level	Comments
Macro	For highly correlated risks, a global system for diversifying risks geographically can help ensure the viability of insurance systems in a country or region. A government, institution or international charity might use index insurance for a disaster relief fund or to fund relief activities after a natural disaster.
Meso	In meso-level index-based insurance schemes, a reinsurer makes payouts to national banks or NGOs, so that they can respond to economic losses resulting from natural disaster.
Micro	Micro-level index-based insurance for agriculture targets farmers or herders – livestock index-based insurance. Coverage is usually provided by local insurance companies; premiums are either paid in full by clients or subsidized, depending on whether the objectives are promotion or protection.

Sources: MCII, Germanwatch and UNU-EHS, 2008; UNFCCC, 2008.

The macro level refers to the international/regional reinsurance[8] market, while the meso level looks at weather index insurance for national governments, to facilitate the timely availability of adequate funding for disaster response activities. Micro-insurance is characterized by low premiums or coverage and typically target lower-income individuals. The following sections explore two WFP micro-level insurance pilot projects in China and Ethiopia in 2009, and a macro-level experience in Ethiopia.

4. Ethiopia macro-level index insurance pilot 2006

Macro-level insurance can be used by governments to ensure the provision of critical services in the case of weather and other shocks. A well known example is the WFP Ethiopia disaster insurance pilot project of 2006.

Although impending drought-related severe food insecurity can be detected with early warning systems, Ethiopia's disaster response mechanism currently requires evidence of hungry people before donors are approached for appeals, let alone relief is provided. There is therefore an opportunity to act early and prevent some of the anticipated impacts. Index insurance payouts can be a tool for triggering timely relief funds, making disaster response more effective and cost-efficient. Since 2006, the Ethiopian government has been committed to shifting from post-disaster relief to risk management as an approach to emergency response (Hess, Wiseman and Robertson, 2006).

The rationale for such an initiative is clearly explained by Barrett (2006):

> *Individuals and communities are resilient. Given the resources to manage shocks while they still have time to do so, crises can often be averted through early preventive response by donors (...) massive deliveries of food aid are often unnecessary if timely delivery of appropriate resources are made available in order to equip communities and vulnerable households with the means to manage the oncoming shock before the collapse into crisis.*

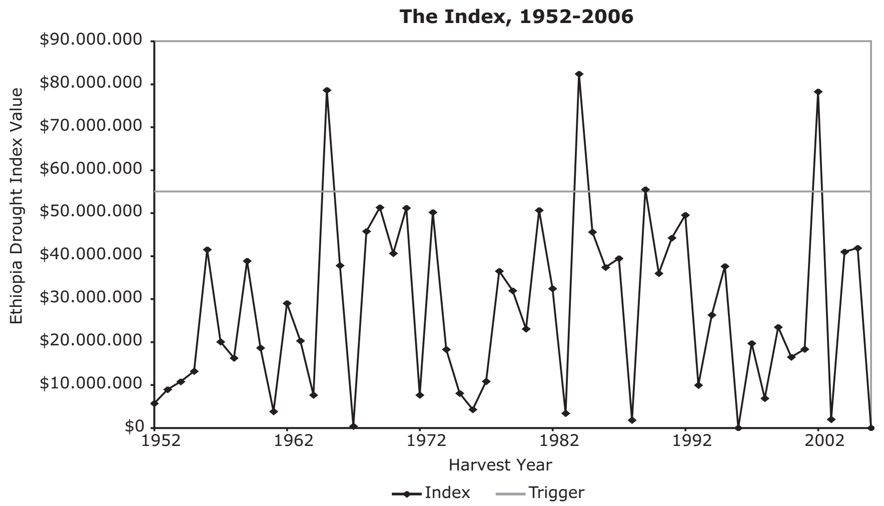
In 2006, with the support of WFP and the World Bank, the Ethiopian government implemented the first index-based national disaster insurance programme of its kind. The mechanism targeted an estimated 5 million transiently food-insecure people, who face food insecurity risk when drought strikes, but are usually able to sustain themselves under normal weather conditions. These people are also beneficiaries of the Productive Safety Net Programme (PSNP, chapter 20).[9] The seasonally food-insecure risk becoming chronically food-insecure if they do not receive timely support during drought conditions, as they are forced to resort to negative coping strategies, such as the sale of productive assets. Drought index insurance that releases adequate funds on time, is therefore of great importance and may make the PSNP effective and manageable.

AXA Re, a Paris-based reinsurer, won the insurance tender for the pilot project using a sophisticated index based on Ethiopia's historical rainfall and agricultural output. The premium was set at US$930,000 for a maximum payout of US$7.1 million. WFP entered the contract on behalf of the Ethiopian government, and the major part of the premium was covered by the United States Agency for International Development (USAID).

The reinsurer and WFP used historical rainfall data from the Ethiopian National Meteorological Agency (NMA) and a crop-water balance model to develop the Ethiopia Agricultural Drought Index (EADI), which had a correlation of about 80 percent with the number of food aid beneficiaries between 1994 and 2004. Analysis of the historical data revealed a one in 20 probability of catastrophic drought in Ethiopia, as occurred in 1965, 1984 and 2002.

During the 2006 main crop season, the Meher,[10] 26 weather stations across the country measured normal rainfalls. These were confirmed by cross-checks with remote sensing techniques. Field observers also reported that the index captured the rains and crop growth patterns accurately. There was therefore no payout in 2006, owing to favourable weather conditions. As seen in Figure 8.3, the drought index trigger value of US$55 million was not reached.

Figure 8.3 Ethiopia agricultural drought index, 1952 to 2006



Source: WFP, 2006e.

One of the greatest challenges related to the accuracy of input data for calibrating the 2006 model. This so-called basis risk was caused by a discrepancy between sowing periods and actual farming practices. For instance, owing to slightly delayed rains, the traditional cereal teff was sown later than in the model used to calculate the trigger, and therefore the payout. To avoid such discrepancies, more detailed and accurate information on actual sowing periods and growing cycles should be integrated into any future model (Hellmuth *et al.,* 2009).

Despite the challenges, the pilot project revealed that: (i) it is feasible to use market mechanisms, such as the AXA Re partnership, to finance drought risk in Ethiopia; (ii) it is possible to develop transparent, timely and accurate indices for triggering drought-related emergency funding; and (iii) the time is right for facilitating predictable *ex-ante* resources that allow governments to put contingency plans in place, which in turn permit earlier and more productive response to shocks – i.e., managing risk rather than managing crisis (Hess, Wiseman and Robertson, 2006).

Building on the 2006 experience, in 2007, WFP, the Government of Ethiopia, the World Bank and the United Kingdom's Department for International Development (DFID) expanded the concept by designing a comprehensive drought risk management framework that includes risk financing. The World Bank piloted the risk financing component of this framework with a US$25 million contingency grant, which was triggered by WFP's EADI owing to failure of the 2008 short season rains – the Belg.

At the same time, WFP and the Government of Ethiopia, in partnership with the World Bank, brought to life the Livelihood, Early Assessment, Protection (LEAP) project. LEAP is both an approach and a software based on a water balance model. Studies by the Food and Agriculture Organization of the United Nations (FAO) show that the Water Requirement Satisfaction Index (WRSI) model can be related to crop production using a linear yield reduction function specific to a crop (Doorenboos and Pruitt, 1977). It is particularly successful in capturing the crop's response during drought (Senay and Verdin, 2002).

The software allows users to quantify and index the drought and excessive rainfall risk in a particular administrative unit of Ethiopia. LEAP can then be used, for example, to monitor this risk and guide disbursements for a PSNP scale-up. LEAP uses ground and satellite rainfall data to calculate crop production estimates, and subsequently livelihood stress indicators for vulnerable populations who rely on rainfed agriculture. Based on these, it then estimates the financial magnitude of the livelihood saving interventions that these people will need in the event of a weather shock. In this way, LEAP provides a good proxy estimate of the funding needs for protecting transiently food-insecure people's livelihoods at the time of a shock, by using an independent, objective, verifiable and replicable index of livelihood stress in the country. It conveys this information in near real-time, to ensure that the response to a livelihood crisis is as timely and effective as possible. It is similar to a more developed and integrated EADI.[11]

Currently, the Government of Ethiopia and donors are negotiating the third PSNP for 2011–2014. The World Bank is introducing a US$160 million risk financing component into the PSNP and has asked WFP to design, and integrate into LEAP, sub-national drought, flood and pastoralist indices for this component, ready to trigger the contingency if needed. This mechanism will allow a temporary increase in PSNP beneficiary numbers in post-shock and pre-emergency settings, thereby saving many livelihoods.

5. Ethiopia micro-level insurance pilot 2009

5.1 Background

Based on its previous risk financing experience at the macro insurance level in Ethiopia and on its subsequent experience of LEAP, in 2009, WFP entered into partnership with local stakeholders for the Joint Project on Weather Index Agricultural Insurance in Bofa Area.[12]

The objective of this project was to reduce the vulnerability of poor, rural smallholder farmers to severe and catastrophic weather risks and to assess and test the viability of weather index agriculture insurance products in rural Ethiopia. It provides an example of how weather index insurance can be used to reform disaster response by moving from a reactive approach to an active preparedness mechanism.

Ethiopia is a low-income, food-deficit country. Chronic food insecurity affects 10 percent of the population; even in normal rainfall years these households cannot meet their food needs and rely partly on food assistance. As a consequence of the 2002 drought, the second-most severe in recent history, a record 13 million Ethiopians required emergency assistance in 2003, translating into 1.5 million mt of food aid. In the last ten years, an average 870,000 mt of food aid has been provided annually, primarily through emergency response.

Smallholder farmers have developed many traditional risk management strategies that address limitations to productivity other than weather, such as land tenure, but these usually fail in times of covariate shocks such as drought in areas that depend on rainfed agriculture. Traditional coping mechanisms address idiosyncratic shocks, such as family illness, accidents, livestock death and fire, but they have limited scope for shocks that affect entire risk sharing communities. Smallholders who are sure that timely, sufficient and guaranteed assistance, such as an insurance payout, will be available as a *de facto* risk management opportunity in times of covariate shock such as drought, may be encouraged to engage in more profitable income strategies, such as purchasing better seeds or using more fertilizer.

5.2 Partnership

The partners involved in the pilot project were: (i) the Lume-Adama Farmers' Cooperative Union in Bofa and its insured farmers, as the main actors and the focus of the evaluation framework; (ii) the Ethiopian Ministry of Agriculture and Rural Development, including its extension workers; (iii) the Nyala Insurance Company (NISCO), as the primary implementer and recipient of technical assistance; (iv) Swiss Re, as the reinsurance company behind NISCO; (v) NMA, as the primary source for rainfall data; and (vi) WFP, represented through its Headquarters-based disaster risk reduction policy unit, vulnerability assessment and mapping (VAM) section at the Ethiopia country office and colleagues from the Nazareth sub-office.

The partnership was governed by a Memorandum of Understanding among NMA, the Ministry of Agriculture and Rural Development, NISCO and WFP. Linking government bodies and the private sector, with WFP acting as an intermediary, has proved to be a successful cooperation model. Uncomplicated and near real-time access to weather data, combined with transparent communication of pilot details and developments to all stakeholders were crucial to its success.

5.3 Contract design

The insurance scheme was based on a simplified version of the WRSI approach, and covered haricot beans during the Meher agricultural season.[13] The index was calculated from the crop's water supply and demand during a growing season, i.e., the ratio of actual seasonal evapo-transpiration to the seasonal crop water requirement.

NISCO, the farmers' union and the farmers themselves were consulted frequently during development of the insurance policy, ensuring a participatory and transparent process leading to broad ownership of the pilot project. The use of a simple panel displaying the rainfall deficit calculation, a visit to the nearby NMA rain gauge[14] and the installation of an automated third-class weather station[15] were valuable in building the farmers' trust.

The insurance policies were procured by the Lume Adama Farmers' Cooperative Union[16] for 137 of their members in the Bofa area, covering a total of 159.75 ha of haricot beans. The union is backed by a credit institution that facilitates low-cost credit for union members at the start of the season. The union used this mechanism to pre-finance part of the insurance premium, as otherwise the insurees would not have been able to purchase the policy.

In consultation with agricultural extension workers, union members and NISCO, the production cost for 1 ha of haricot beans was set at ETB 4,000 (US$320), including estimated agricultural inputs and labour costs. Based on drought probability calculations derived from 30 years of historical rainfall data for the area, the premium was set at ETB 460/ha, or 11.5 percent of the total sum insured.

5.4 Results

Erratic and insufficient rainfall triggered insurance payouts according to the contract terms and conditions. The 137 insured farmer families received a total of ETB 309,000 (US$24,700) in claim settlements on 1 December 2009. The amount per farmer varied depending on the area insured. Considering the total of ETB 73,485 in premiums collected, NISCO's "investment" generated a substantial ETB 235,515 or US$18,826.

An ongoing evaluation will produce results and lessons that will contribute substantially to understanding of the effectiveness, appropriateness and efficiency of drought-related weather index-based insurance products in rural Ethiopia. Preliminary lessons point towards the need to: (i) improve the availability and accessibility of quality weather station data; (ii) refine delivery channels and keep farmers better informed on products and underlying triggers; (iii) strengthen the capacity of stakeholders at all levels; (iv) augment the overall effectiveness by combining with other disaster risk reduction tools for prevention; and (v) improve the legal and regulatory framework for index products.

6. WFP/IFAD-supported weather index insurance pilot for farmers in Anhui Province, China[17]

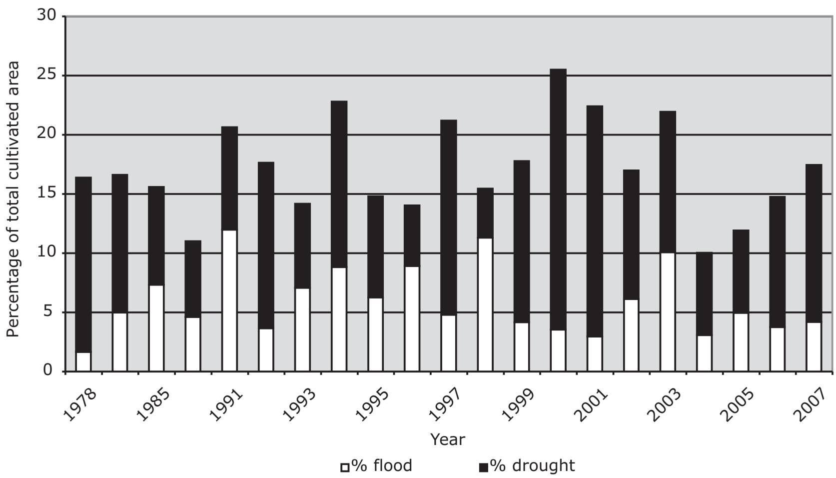
6.1 Background

China is highly exposed to natural disasters and the potential impact of climate change. Over the past ten years, natural disasters have affected between a quarter and a third of arable land in China, and are estimated to destroy 10 percent of annual crops. Cultivated land covers 122 million ha, representing 12.7 percent of China's total land area of 9.6 million km^2. Rice, wheat, maize and soybeans are the main subsistence crops in China, representing 64 percent of total sown area. The 314 million people directly engaged in the agriculture sector account for 41 percent of the total labour force. However, agriculture accounts for only

11 percent of total GDP. Drought, flood, hail and freeze are the major threats to agriculture in China, particularly in northern, northeastern and western areas. On average, they reduce at least 30 percent of crop outputs on 54 percent of Chinese farmland (Swiss Re, 2008a; 2008b).

Since 2007, China's central and provincial governments have supported farmers with crop insurance premium subsidies as an incentive to invest in high-quality inputs and farm technology. In 2007, the Chinese government spent about US$300 million on agricultural insurance subsidies for multi-peril crop insurance (MPCI) products. This increased to US$900 million in 2008. As a result, the Chinese agricultural insurance market had reached a premium volume of about US$1,744 million per annum by September 2009, making it the second-largest market in the world.

Figure 8.4 Drought- and flood-affected agricultural areas in China, 1978 to 2007



An area is considered affected if the yield loss is equal to or greater than 30 percent.
Source: Government of the People's Republic of China, 2008.

6.2 Partnership

The Ministry of Agriculture of the People's Republic of China, represented by the Institute of Environment and Sustainable Development in Agriculture (IESDA), the Chinese Academy of Agriculture Sciences (CAAS), WFP and IFAD signed a Memorandum of Understanding on 18 April 2008 in Beijing, initiating technical collaboration on the Joint Project on Weather Index Agricultural Insurance in Vulnerable Rural Areas. The project aimed to reduce the vulnerability of rural smallholders in China to severe and catastrophic weather risks, mainly drought and water-logging. The Anhui Guoyuan Agricultural Insurance Company (Guoyuan), a local agricultural insurance company was selected to pilot this weather index insurance product.

6.3 Contract design

The pilot weather index group insurance policy was written for the Yanhu village in the north of Changfeng county, Anhui province, China. Changfeng is located in the watershed of the Yangzi and Huai rivers. The surface is undulating and the soil is very porous with low capacity to retain water. Rainfall shortages are the main problem affecting the staple crop rice, which is also vulnerable to heat waves during the flowering phase in July and August. Village crops include rice, wheat, rapeseed and strawberries. Yanhu has a population of about 1,200 people, with average per capita annual income of RMB 3,400 (US$498), which is 26 percent below the county average. The county is one of 592 national poverty counties.

From January to May 2009, in collaboration with Anhui Meteorological Institute, the Commission of Agriculture of Anhui Province and Guoyuan, the project team designed the drought index insurance for Changfeng and the water-logging index insurance for Huaiyuan.

For the drought index insurance, several products were designed with different premiums and coverage. Guided by Chinese and international experts, Guoyuan designed the weather index insurance product for paddy rice in Changfeng county, which the China Insurance Regulatory Commission approved for piloting on 25 May 2009. Guoyuan also designed the water-logging weather index insurance, with technical assistance from the project team. Due to temporal constraints, however, the index insurance has not been implemented, but was simulated instead.

The insurance product was sold as group insurance to Yanhu village, protecting 85 ha of rice with a total sum insured of US$56,000. The policy covered the entire rice crop of 482 village households. Under the group policy, each household was insured according to its plot size, at RMB 300 (US$50) per 0.07 ha, which is roughly equal to input costs. Plot sizes vary from 0.04 to 0.5 ha. The premium was RMB 12 (US$2) per 0.07 ha, or US$26/ha – 4 percent of the sum insured. Farmers paid 20 percent of the premium cost – RMB 2.4 per 0.07 ha. The other 80 percent was subsidized by the insurer, in line with national MPCI subsidy rules. There was no reinsurance arrangement for this weather index insurance programme given its very small size.

6.4 Results

Owing to favourable weather conditions – adequate rains and no heat waves – the insurance payouts were not necessary. A recent evaluation of the pilot project has brought to light several lessons. A successful continuation of index-based insurance will require: (i) improved availability, accessibility, quality and quantity of weather data; (ii) enhanced government support; (iii) improved integration into existing delivery channels and networks; (iv) increased stakeholder awareness, through better promotion of products; (v) a strengthened legal and regulatory framework for index products; and (iv) better integration of index insurance into national disaster management frameworks (Zhu, 2010; Dick, 2010).

7. Good practices in weather index insurance[18]

Many programmes, including the WFP Ethiopia and China experiences, were launched only recently, and it is too early to judge their success. However, many schemes show promise and, although not yet at full scale, are providing valuable lessons for the future. WFP and IFAD recently completed a joint review of many insurance programmes, leading to the identification of six key lessons for successful programme performance:

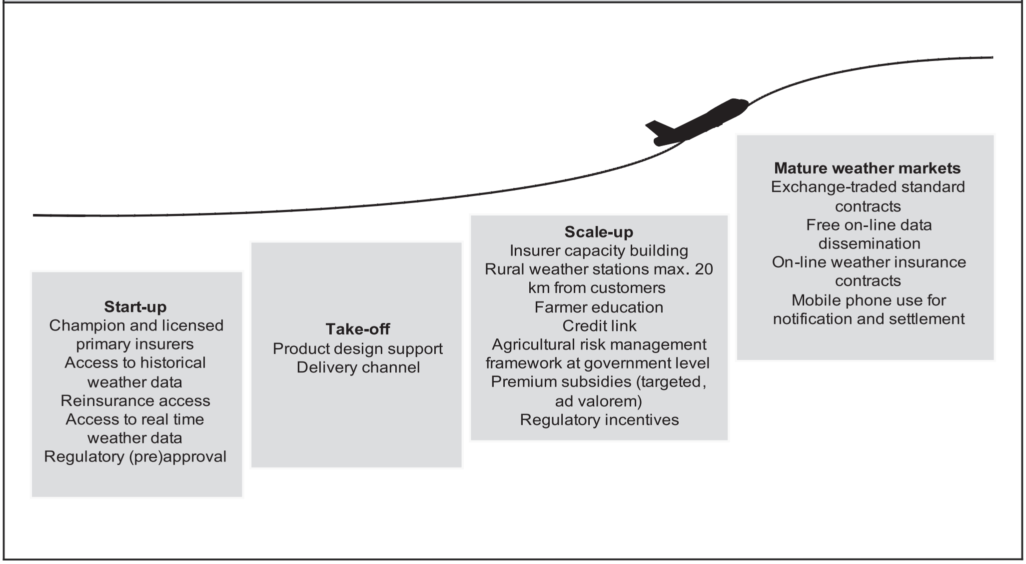
- *Focus on creating value for the insured:* Insurance should be part of a package of related services that cover broader agricultural development and disaster management initiatives.
- *Build capacity and ownership:* It is essential that local stakeholders have the capacity to overcome the challenges and establish effective weather index products.
- *Build awareness of index insurance products:* Client education is critical in achieving and sustaining a demand for index insurance products.
- *Develop efficient and trusted delivery channels:* Building on existing and familiar networks is more likely to bring farmers on board.
- *Ensure reinsurance is in place:* Access to international risk transfer markets is crucial for the sustainability of index insurance.
- *Develop automated infrastructure for quality weather data:* Real-time availability and accessibility of quality weather data can reduce basis risk and improve product performance and transparency.

- *Promote enabling legal, regulatory and policy frameworks:* Work with government partners to establish transparent and effective frameworks.
- *Monitor and evaluate weather index-based insurance schemes:* Better understanding of the impacts on poverty will help the continuous adjustment of index insurance policy designs.

Although private insurers might be expected to take the lead in developing and supplying index insurance, in nearly all cases the initiating role was played by others, especially the public sector, multinational agencies and NGOs. Important public goods and roles need to be in place, otherwise the private insurance sector faces high set up costs and barriers. There is also a first mover problem, because any insurer that invests in research and development of index insurance products cannot prevent competitors from copying its products. If index insurance is to scale up, governments and donors will need to play important enabling and facilitating roles, which include:

- building weather station infrastructure and data systems and making the data publicly available in a timely manner;
- financing agro-meteorological research to guide product design, and making the results publicly available;
- educating farmers about the value of insurance;
- facilitating initial access to reinsurance;
- supporting product design;
- supporting the development of sound national rural risk management strategies that do not crowd out privately provided index insurance;
- subsidizing protection insurance where it is more cost-effective than existing types of public relief, and using smart subsidies to kick-start insurance markets for development;
- supporting impact studies to learn from ongoing index insurance programmes and demonstrate their *ex-post* economic and social benefits;
- providing an enabling legal and regulatory environment.

Figure 8.5 Start-up conditions and scale drivers



Source: Hess and Hazell, 2009.

Questions about the role of index insurance remain, but there is enough evidence to warrant greater investment in its development. Such investment will become even more important as climate change increases the risk and severity of catastrophic losses in rural areas. Households need to adapt to climate change; index-based insurance can be both a tool for transferring some of the incremental risk induced by climate change and a catalyst for adaptation.

8. Conclusions

Index insurance has much potential as a market-mediated approach to managing covariate risks for farmers, banks, input suppliers and relief agencies. However, it is not a panacea. It remains a very specific tool – a scalpel rather than a hammer – that is relevant for specific types of risks in regions where many people are vulnerable.

Initial results are encouraging and show that weather index-based insurance can work, but few programmes have demonstrated any real capacity to scale up. There has also been limited spontaneous development by the private sector; governments or international agencies such as the World Bank have initiated activities. This reluctance from the private sector seems to stem from the high basis risk associated with having insufficient weather stations;[19] initial problems that private firms cannot easily overcome on their own; the need for marketing intermediaries to link farmers with insurers; and the cost of many risk management products, which is too high for many smallholders to afford.

There is need for further product and institutional innovation and for a stronger public sector role in helping to launch new programmes. In particular, governments need to create more enabling regulatory environments, set up more weather stations, and provide a first line of reinsurance. The case for these kinds of public investments and support could be strengthened through good monitoring and evaluation systems that demonstrate the *ex-post* economic and social benefits over the longer term. If index insurance cannot be made to work better, many governments and donors are likely to be pushed further into providing expensive safety net programmes for rural people, especially as climate change increases the risk and severity of catastrophic losses.

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1 Low-income populations, particularly small-scale farmers will lose an even greater proportion of their incomes.

2 www.unisdr.org/disaster-statistics/impact-affected.htm.

3 At the Word Conference on Disaster Reduction, held in Kobe, Hyogo, Japan in January 2005, 168 governments adopted a ten-year plan to make the world safer from natural hazards. The Hyogo Framework for Action (HFA) is a global blueprint for disaster risk reduction efforts over the next decade. Its goal is to reduce substantially disaster losses – in lives and in the social, economic and environmental assets of communities and countries – by 2015.

4 At its thirteenth session in Bali, the Conference of the Parties (COP13, 2007) to the United Nations Framework Convention on Climate Change (UNFCCC) drew up an action plan identifying negotiation elements for an agreement to be reached at COP15 in Copenhagen in 2009.

5 For a comprehensive overview on index insurance see Hellmuth *et al.,* 2009.

6 In non-indemnity insurance, the sum that the insured is entitled to receive from the insurer does not necessarily bear any relation to the actual loss, if any, suffered by the insured. Instead, it is linked to an index, such as rainfall.

7 Insured farmers have better access to credit because the insurance policy can serve as collateral (Mapfumo, 2008).

8 Index insurance works best for covariate risks – i.e., risks that affect all members of a community or region at the same time – because this reduces basis risk. However, this presents a converse problem for the insurer: when an insured event occurs, all those who have purchased insurance against the regional index must be paid at the same time. Moreover, if the insured risks indexed against different rainfall stations are highly correlated, the insurer faces the possibility of having to make huge payments in multiple regions. International reinsurance is already available for some kinds of natural disaster risks. The simplest form of reinsurance is a stop-loss contract, in which the primary insurer pays a premium to obtain protection if its losses exceed a certain level. As an alternative to reinsurance, recent developments in global financial markets are making it increasingly feasible to use new financial instruments to spread covariate risks more widely, such as weather derivatives and catastrophe bonds.

9 For more details on PSNP see http://go.worldbank.org/E4PE1DEGS0.

10 Depending on the crop, but usually from June to September.

11 For more details, see www.hoefsloot.com/index.php?title=leap_development.

[12] Bofa *kebele* – the smallest administrative unit in Ethiopia – is in Boosat *woreda*/district near Nazreth city, or Adama in the Oromia language, 40 km southeast of Addis Ababa.

[13] Haricot beans account for about 20 percent, or 7,880 ha, of the crops planted throughout the Bofa area. The insured crop was selected based on discussions with farmers, farmers' union representatives and NISCO.

[14] NMA's third-class weather station in Bofa consists of a simple rain gauge and a thermometer placed in a protected perimeter in a school yard. The school principal is in charge of manually recording daily rainfall and temperature data, which are sent once a month by mail to the data collection centre.

[15] In a separate but linked project activity, WFP installed two additional low-cost weather stations with automated data transmission next to the existing NMA weather station. The purpose was to test the appropriateness and accuracy of all three stations and to inform NMA on potential options for automating, upgrading and expanding its existing weather station network.

[16] The union consists of four primary cooperatives and has a total of 22,896 members (June 2009). Its main activities are agricultural input supply, produce marketing, seed multiplication and credit services.

[17] This project was undertaken in the context of the Weather Risk Management Facility (WRMF), a WFP/International Fund for Agricultural Development (IFAD) partnership.

[18] This section is based largely on experiences of the China and Ethiopia projects, as captured in non-formal monitoring and back-to-office reports and the forthcoming publication by Hess and Hazell under WRMF.

[19] Many of the potential interventions have multiple benefits. For instance, real-time weather data from weather stations can feed into early warning systems at various levels.

section II
Thematic areas