FACT SHEET 7

Disaster Risk Financing for Agriculture

Technical Learning Series

Disaster Risk Financing & Insurance Program

SUPPORTED BY WORLD BANK GROUP

Risk Finance Instruments: Macro and Meso-level Risk Transfer for Agriculture

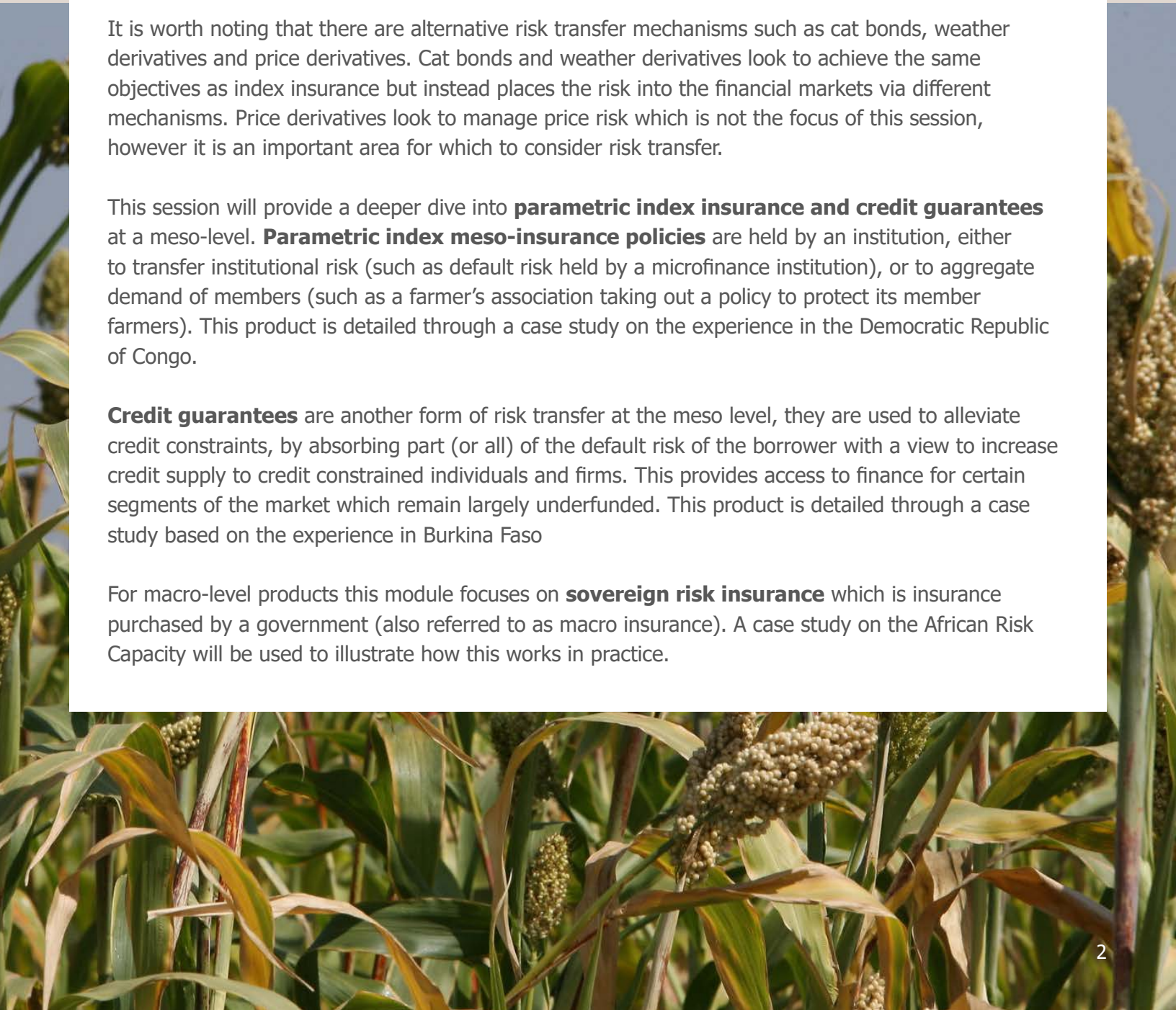
The 7th webinar in the Disaster Risk Financing in Agriculture Series discusses the role of macro and meso-level risk transfer solutions for agriculture, with a focus on insurance products and credit guarantees. This session, builds on the previous session on micro-level risk transfer solutions, providing an overview on **how** meso and macro risk transfer products work, and **when** and **why** they may be suitable for the agricultural market. The session outlines the objectives of meso and macro level solutions and which instruments may be most suitable for different environments.

The webinar has a large section dedicated to learnings from international experience and case studies, in particular experience from Burkina Faso, Democratic Republic of Congo, and the African Risk Capacity. The case studies talk through the key design considerations in each of the countries and how the instrument work alongside other financing instruments and risk management.

Meso-level and Macro-level risk transfer solutions

Meso and macro-level risk transfer products offer organisations, (governments, financial institutions, cooperatives etc.) different ways to transfer their risk. The type of risk that the organisation may want to protect itself from will determine which solution may be most suitable and also how this solution would best be structured. This session focuses on meso and macro-level risk transfer solutions by highlighting some key products and presenting case studies to illustrate how they work in practice.

The agriculture supply chain faces many risks which concern organizations and governments, some examples being production risk, market risk, price risk, institutional risk, etc. The macro and meso-level risk transfer instruments that are discussed further in this session, index insurance and credit guarantees, relate to managing **production risks** for the key stakeholders involved.



It is worth noting that there are alternative risk transfer mechanisms such as cat bonds, weather derivatives and price derivatives. Cat bonds and weather derivatives look to achieve the same objectives as index insurance but instead places the risk into the financial markets via different mechanisms. Price derivatives look to manage price risk which is not the focus of this session, however it is an important area for which to consider risk transfer.

This session will provide a deeper dive into **parametric index insurance and credit guarantees** at a meso-level. **Parametric index meso-insurance policies** are held by an institution, either to transfer institutional risk (such as default risk held by a microfinance institution), or to aggregate demand of members (such as a farmer's association taking out a policy to protect its member farmers). This product is detailed through a case study on the experience in the Democratic Republic of Congo.

Credit guarantees are another form of risk transfer at the meso level, they are used to alleviate credit constraints, by absorbing part (or all) of the default risk of the borrower with a view to increase credit supply to credit constrained individuals and firms. This provides access to finance for certain segments of the market which remain largely underfunded. This product is detailed through a case study based on the experience in Burkina Faso

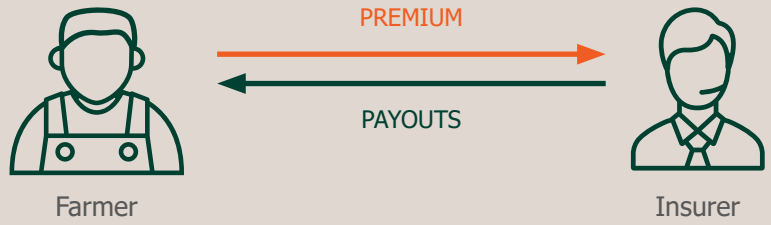
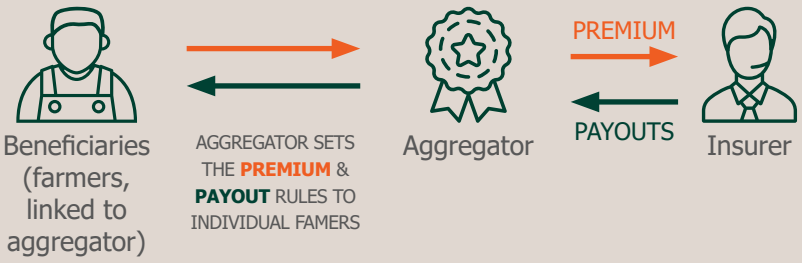
For macro-level products this module focuses on **sovereign risk insurance** which is insurance purchased by a government (also referred to as macro insurance). A case study on the African Risk Capacity will be used to illustrate how this works in practice.

Micro versus Meso and Macro-level products

How do micro, meso and macro index insurance products differ?

Although micro, meso, and macro insurance are all designed to protect against the production loss of individual farmers, they vary in the ultimate purchaser of insurance. The purchaser could be a government, in the case of macro insurance, or an aggregator (such as a bank, cooperative, or inputs provider) in the case of meso insurance. A range of stakeholders, primarily farmers and the purchaser of insurance, will benefit from coverage, although the extent to which these benefits are direct or indirect depends on the type of insurance, as well as its design.

FIGURE 1 - MICRO, MESO AND MACRO INSURANCE

Type of Insurance	Who?	How?
Micro	• Individuals are policyholders • Usually smallholder farmers • Often grouped in farmer organisations	
Meso	• Aggregators are policyholders (MFI[1], bank, co-operative, agro-processor, contract farmer, input supplier…)	
Macro	• Government/ development partner is the policyholder • Payouts made directly to vulnerable farmers	

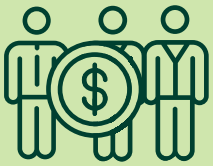
Source: World Bank Group

[1] Microfinance institutions

In the case of meso insurance, the risk aggregator (e.g., a service provider such as a bank) formally purchases insurance and it is the policyholder responsible for paying over premium and receiving payouts when an event is triggered: farmers who borrow credit from the bank may participate directly or indirectly in the insurance program. In the direct case, they may be required by the risk aggregator (bank) to contribute towards premiums and receive part or all of the payouts. In the indirect case, the aggregator (bank) absorbs the premium costs and the payout is used to protect their business and ensure continued provision of key services to the farmer (such as lending).

Macro-level index insurance (also referred to as disaster risk insurance or sovereign risk insurance) is typically purchased by regional or national government to finance early response to climatic and natural disasters. In this case government is the policyholder and responsible for payment of premium (sometimes donors and international development banks provide premium co-finance) and receive lump sum payouts to provide immediate liquidity to finance post-disaster response – government sets the payout rules (Figure 1). Some of the earliest of these programs include the CADENA program in Mexico (starting in 2003), a partnership between national and state governments to purchase catastrophe climatic index insurance to protect subsistence farmers, livestock producers and fishermen, Ethiopia national rainfall deficit pilot (2006); Malawi national maize rainfall-deficit index cover (2009) and then a series of regional pool index insurance programs including CCRIF (2007) providing windstorm, volcanic eruption and excess rainfall protection to Caribbean and Central American Governments; and African Risk Capacity (ARC) providing drought risk protection since 2014/15.

Macro and meso-level products can have various advantages compared to micro-level individual farmer products and programs, not least the reduced transaction costs of administering a single policy with a risk aggregator which can protect many thousands of small-scale farmers or with a government. Depending on the design of these schemes there may, however, also be tradeoffs when using these products compared to using micro insurance. In order to most clearly understand the nuances between these products, the table below outlines the advantages and tradeoffs for micro, meso and macro-level index insurance solutions. Some of these concepts for micro-level index insurance were discussed in the last session.

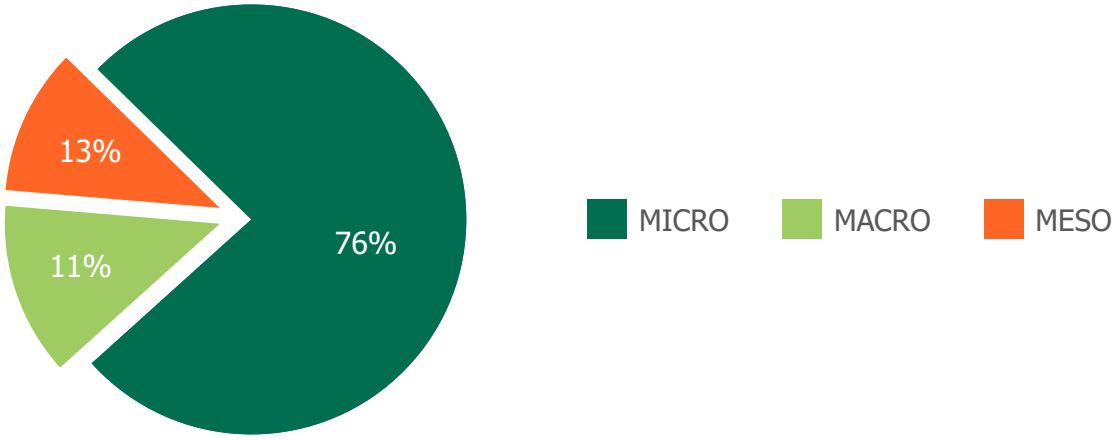
Approach	Concept	Advantages	Tradeoffs
 Micro Level index insurance	Index insurance retailed directly to farmers - intermediated through institutions with rural outreach (Objectives mostly associated with rural development/rural finance)	• Suitable for the commercial farmers sector with access to finance and/or other services • Promotes "in farm" risk management practices • De-risks and enables productive investment • Improves access to rural finance • Creates a culture of insurance among farmers	• High administration cost and operational cost • Reputational issues for government/ insurance industry may arise if the product is not well designed (basis risk[2]). This is because the farmer is the policyholder and is entitled to claim in case she suffers losses and does not receive any insurance payout. • The product requires large efforts on farmers' awareness and marketing. • The scale up of the micro-level insurance product can be difficult without well-developed value chains
 Meso Level	Indexed portfolio insurance for rural financial institutions (incl. MFIs) that lend to poor farmers; or for processing companies which contract with farmers (Objective associated with the non-performance of loan portfolios of aggregators, distributes, Banks or MFIs.)	• Can be suitable for well-developed agribusiness value chains on which agriculture inputs are pre-financed by an aggregator (could be a mill, or a cooperative with their own resources or with resources financed by a Bank or an MFI) • Where farmers contribute to the premium payment of insurance, these contributions could create incentives to introduce risk management practices • Where farmers receive a payout from insurance, this approach can create incentives for productive investment and improves access to credit • The aggregator generally has good records of its members/borrowers and can manage premium collection and claims payouts to each member's account which greatly reduces the administration and operating costs for the insurer	• Reputational risk for the aggregator in case the product is not properly designed and payouts are not received and potentially passed onto farmers when this is expected (i.e. basis risk) • Depending on the structure, farmers may or may not be entitled to receive direct payouts from insurance, but they may indirectly (or directly) contribute to premium payment

[2] Basis risk is the risk that the payouts received does not match the losses experienced by the beneficiary

Approach	Concept	Advantages	Tradeoffs
 Macro Level index insurance	Insurance or indexed contingent credit line for governments or international organizations that provide safety nets for the poor (Objectives mostly associated with social assistance on the aftermath of natural disasters)	• Basis risk may be reduced compared with micro insurance due to the reduced level of granularity and precision required and also because a government's ability to absorb downside basis risk is greater than for a micro-level index policy (Miranda & Mulanga 2016) • Reputational issues are reduced as the farmer is only entitled to a pre-defined "assistance" in case of the occurrence of a pre-defined the event. The policyholder in this case is the Government • Where there are awareness campaigns, this can increase the understanding of end beneficiaries around the structure of insurance, for example: when payouts would be made	• Does not promote "in farm" risk management practices • Does not create incentives for investments • Does not create a culture of insurance among farmers • Depending on the amount of the "assistance" the farmers are entitled to it may disincentivize risk management. • The approach requires effort to improve farmers' registration and the delivery of the eventual payouts.

Although the rationale for meso and macro risk transfer is convincing, experience in this area has been limited to date. For example, to date there have been very few meso-level weather index insurance programs that have gone beyond the research and development or pilot implementation stages. The market has primarily comprised micro-level products, however it is expected that the spread of these programs will continue to grow.

FIGURE 2 - SPLIT OF GLOBAL AGRICULTURAL INSURANCE PROGRAMS



For meso programs in particular, the programs which have been introduced are mostly only a few years old and they have not yet produced firm evidence of whether they provide a more cost-effective alternative for agriculture risk, than micro-level weather index insurance or not.

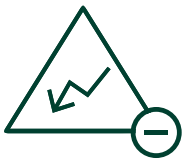
Overview of meso-level index insurance for agriculture

Why meso-index insurance?

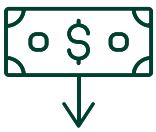
Meso-level insurance handling aggregated exposure to systemic risk can be easier and more effective than dealing with micro-level insurance for individual farmers. These advantages include:

Many hundreds or thousands of small poor farmers can be protected directly or indirectly under a single meso-level policy issued to the risk aggregator, thereby providing premium volume and spread of risk for the insurer and greatly reducing the marketing and promotion costs and underwriting and claims processing costs associated with micro-level or retail sales to individual farmers.

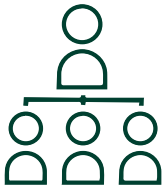
The risk aggregator acts very much like a partner-agent maintaining databases on the beneficiaries, their locations and crop details. They can collect and pay premium to the insurer and, on receiving a lump sum payout, they can distribute the payouts to their clients according to their own payout formula.



Basis-risk is usually less of a problem to manage under a meso-level cover for a large, capitalised risk aggregator than for a traditional small holder farmer with one or two acres of a crop and no savings to fall back on if his/her policy fails to make a payout in the event of severe losses. For the regional aggregator it is important that the index responds accurately to aggregate losses over a county, district, or region and if the index fails to pick up localised losses this is of little economic consequence: however, for the small individual farmer, it is important the index responds to loss at the specific location of his/her farm.



The **major administration and operating cost savings** on a meso-level cover should lead to considerably lower premium rates than charged under a micro-level program.



The risk aggregator can act on behalf of large numbers of small resource poor farmers in purchasing meso-level cover and in negotiating the best terms and conditions. These farmers would normally have limited or no access to micro-level weather index insurance cover due to issues of limited insurance literacy, they are too small to be considered insurable by the insurer, they cannot afford to pay premiums. Finally, they benefit from the protection afforded by the meso-level group cover.

A meso-level program which is able to demonstrate scale and spatial spread of risk is much more likely to attract interest from local insurers and international reinsurers of this class of index insurance business and at more competitive terms that a small micro-level pilot project. The risk aggregator is usually in a much better position to negotiate terms and conditions with insurers and their reinsurers.

Value chain actors / other aggregators can buy index products to protect their own financial exposure to systemic risk and may (or may not) create payout rules that directly or indirectly benefit farmers, benefit to farmers dependent on aggregator.

Some examples of meso-level insurance programs are:

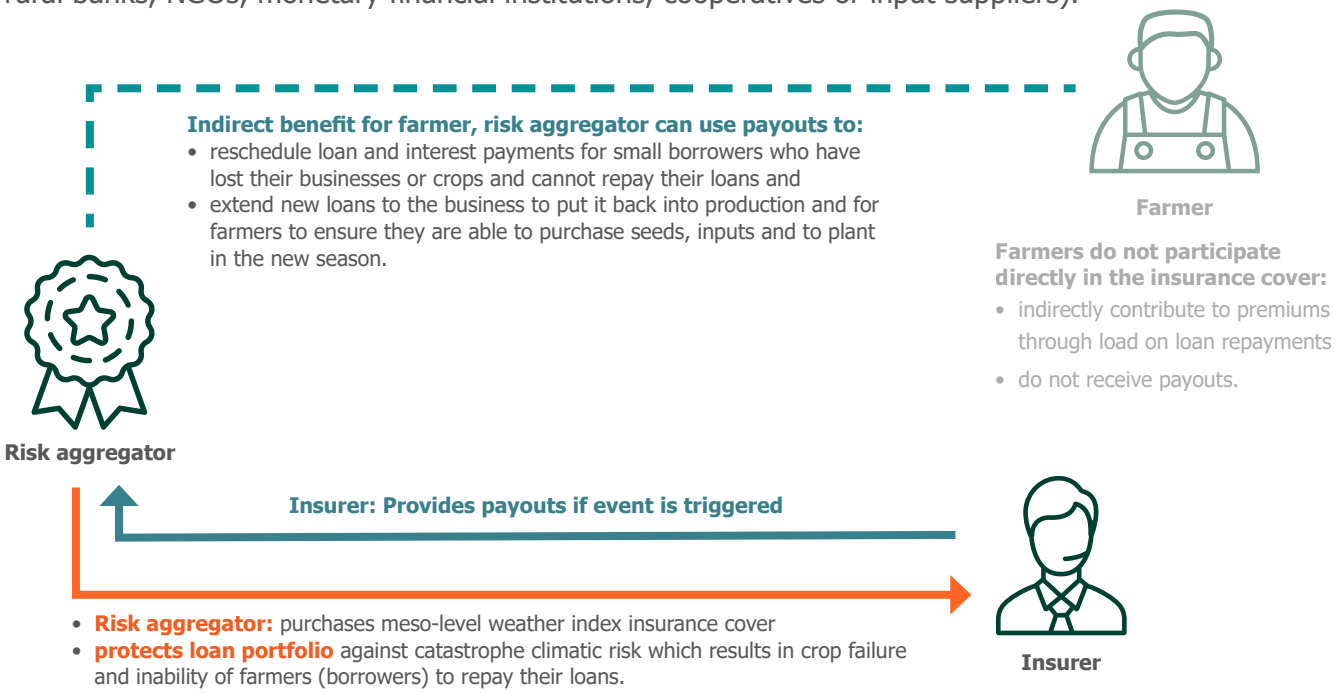
Burkina Faso, Peru, Bangladesh which achieved commercial scale-up

Millennium Villages (Kenya, Ethiopia, Mali); Vietnam which were pilots and no longer active

Note that benefits for aggregators and farmers are **different** depending on the structure of the meso product, this is best highlighted through examples. There is considerable flexibility in the design of a meso-level weather index insurance cover, depending on the objectives to be pursued. Two basic examples are described below.

Structures of meso-level products

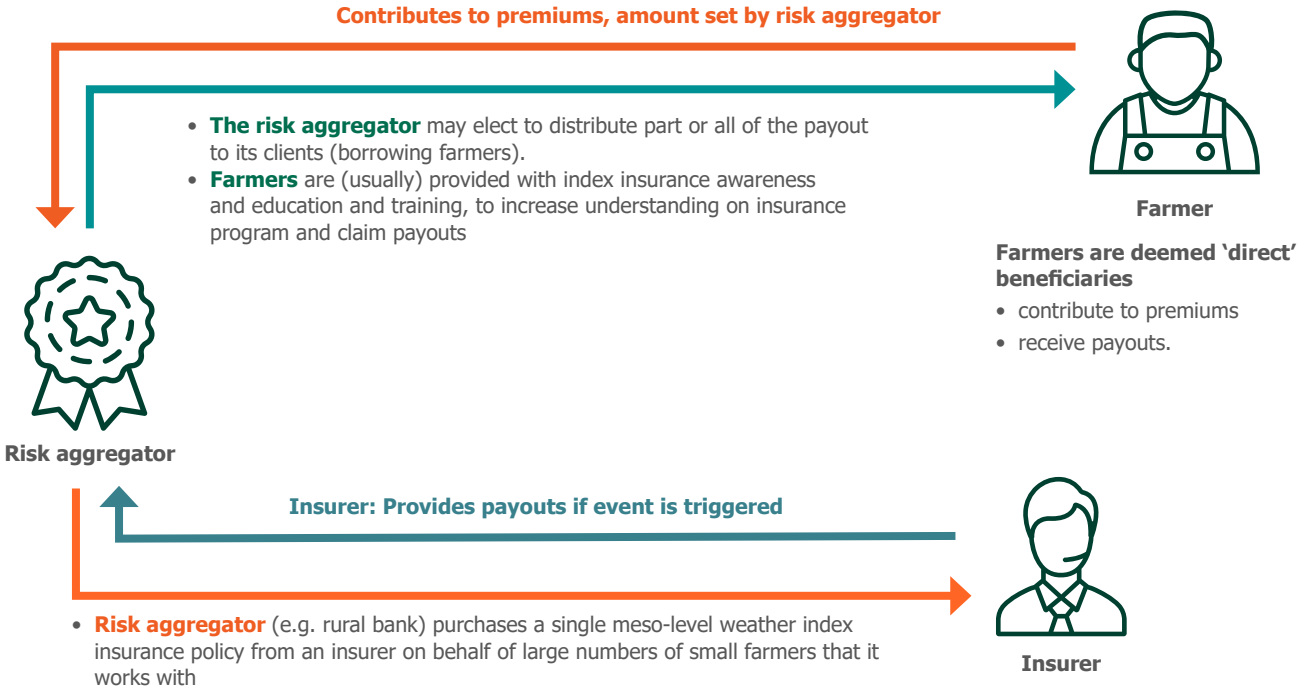
Example 1. Pure Portfolio Financial Protection for regional risk aggregators (e.g. commercial/ rural banks, NGOs, monetary financial institutions, cooperatives or input suppliers).



In this structure the farmers do not benefit directly as they do not receive a payment from the insurance payout, their benefit lies in having their loans restructured by the risk aggregator (bank) in the event of a disaster. The farmers however do receive an indirect benefit from the aggregator (bank) having the ability to reschedule, extend and change the terms of loans to farmers in the event of a disaster. This is an 'indirect' benefit to the farmer.

Such a structure would be potentially attractive to regional banks and other financial institutions and also input suppliers who provide seeds and fertiliser on credit against repayment by the farmers at time of harvest.

Example 2. Purchase of Meso-level Weather Index Insurance cover by a regional risk aggregator and distribution of part or all of the payouts to its small farmer members or borrowers.



In example 2 there is a direct benefit to the farmers as they receive payouts from the meso insurance policy (and also contribute premiums towards this). It would be beneficial in this structure to include capacity building for farmers around index insurance and when claim payouts are expected, such that basis risk experienced by the farmers (where payouts from the aggregator does not correspond to the level of losses) is reduced.

The examples above illustrate two ways in which meso-level products can be structured and how the exact structure determines the benefits to farmers and the specific limitations of a meso-level products versus a micro-level product. Under both examples education around how insurance works is critical. It is more likely that farmers under example 2 will be directly engaged in index insurance and therefore benefit from experience with insurance, by paying premiums, experiencing payouts and accessing financial education programs.

Current state of Meso-level index insurance and future directions

The current experience with meso-level index insurance is relatively limited. Most meso-level index insurance programs are still in the developmental stage or very newly implemented. Unfortunately, many programs so far have failed to attract much support or demand and have either not been implemented or have been discontinued. The reasons why these meso-level programs have failed to be of interest to the risk aggregators are not well documented.

Given the limited experience, there is no clear evidence on whether these programs achieve their intended benefits. In the short term, programs are proposed and designed based on a clear theoretical rationale for their adoption. It is therefore, crucial that programs are designed with strong monitoring and evaluation to improve future design and to support advocacy for such approaches.

Up to now financial institutions lending to SMEs and to small farmers and herders have been slow to recognise the potential role of meso-level index insurance as a way of reducing their exposure to covariate/systemic risk. In many markets, financial institutions lack a comprehensive approach to disaster risk management and financing, and so the need for such insurance products does not become apparent in their strategic planning. Stronger risk-based regulation of financial institutions, with the aim of increasing financial sector stability and protecting customers and the wider economy, would provide clear incentives for adoption of such products.

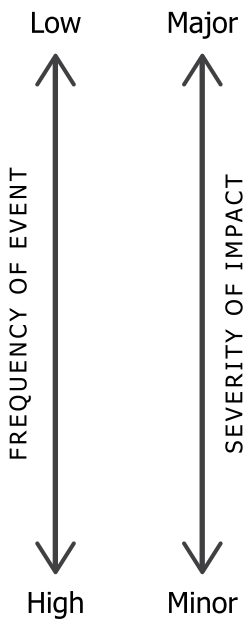
Is the situation changing?

This situation now appears to be changing with the new meso-level weather index insurance initiatives that are being developed as part of financial networks in developing countries. International organisations such as Vision Fund are working with specialist index insurance design companies and risk carriers such as Global Parametrics to design tailor-made solutions for regional financial institutions lending to large numbers of small-scale borrowers in developing countries.

Case Study: Meso insurance in the Democratic Republic of Congo

The agriculture sector of the DRC is particularly exposed to weather hazards such as extreme droughts and excess rains and floods, all of which are expected to increase in frequency and severity due to climate change. It is within this sector context that the World Bank (WB) has approved the first phase of 5 years of a National Agriculture Development Program (NADP) for DRC, for a total of US$500 million that will benefit 1.7 million farmers in 5 Provinces. The overall NADP will extend for 15 years for a total of US$1.5 billion, covering 16 provinces. The NADP aims to support smallholder farmers in the adoption of climate and nutrition-smart agriculture practices and techniques to improve agricultural productivity, market access, and overall resilience of farm income to climate change. However, to receive NADP support, smallholder farmers will contribute their own resources for the on-farm investment, and this is a risky proposition for them because of the uncertainty of the return on their investment due to the possibility of a disaster happening during the adoption period, such as a weather event, that could leave them without their agriculture production and with, their own investment lost.

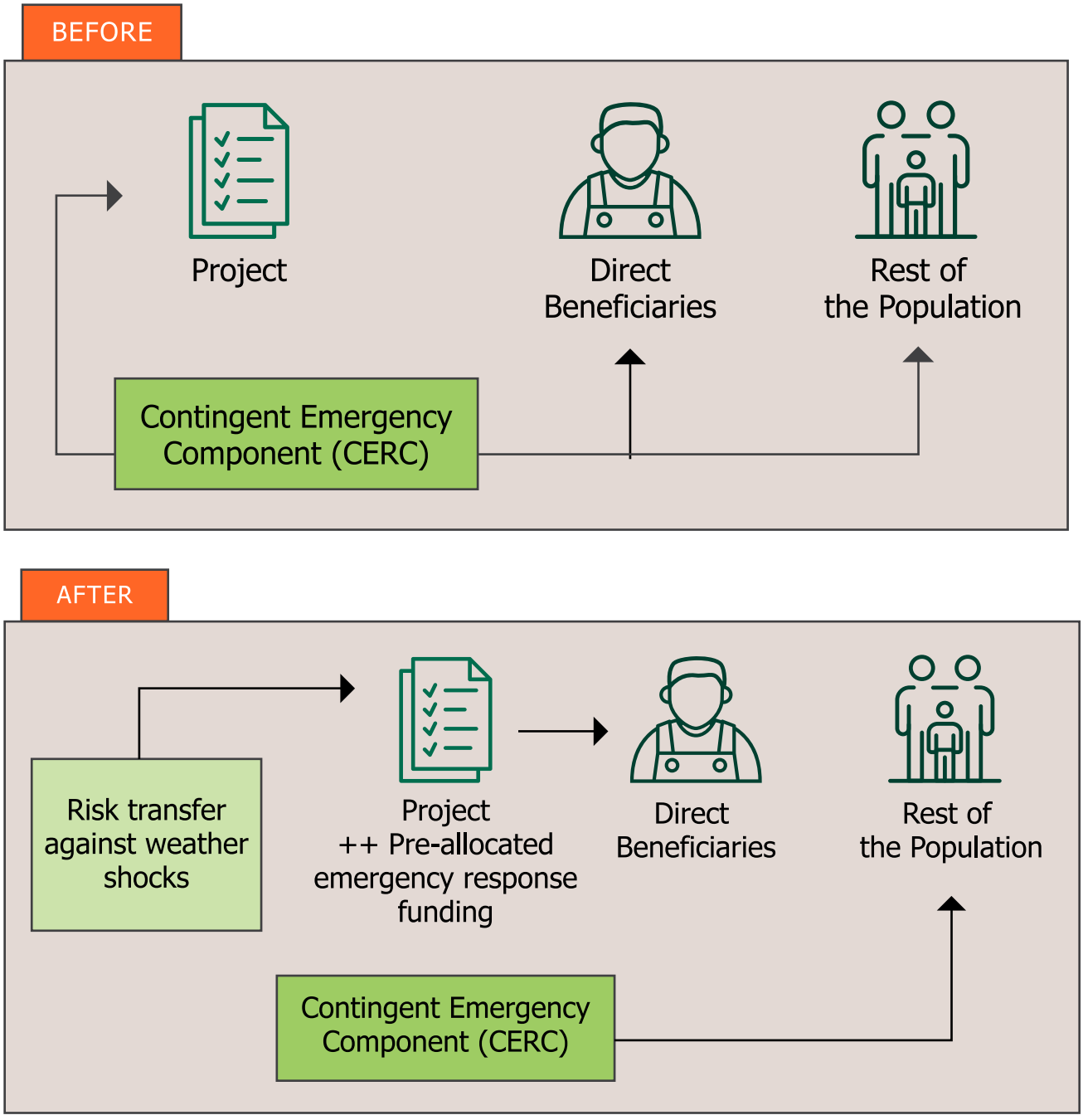
To de-risk farmers' investments in the adoption of climate and nutrition-smart agriculture practices and technologies, the NADP has introduced an innovative contingent finance and response mechanism to safeguard the contributions of the participating smallholder farmers and ensure that they have timely resources to restart production in case of extreme weather events. Lessons learned from other agriculture WB projects in DRC and other countries show that when financing is unavailable or access is delayed, disaster impacts can be unnecessarily high, often failing to meet the WB project development objectives and indicators. Therefore, the World Bank has developed a Disaster Risk Financing (DRF) framework that provides an approach to developing a risk layering strategy to minimize costs and maximize benefits in managing post-disaster liabilities. The NADP took this DRF framework to design the contingent financing mechanism within the agriculture investment operation.



DISASTER RISKS	DISASTER RISK FINANCING INSTRUMENTS
High risk layer (e.g., major earthquake, major tropical cyclone)	Risk transfer: e.g. catastrophe risk insurance, capital market instruments
Medium risk layer (e.g., floods, small earthquake)	Contingent credit
Low risk layer (e.g., localized floods, landslides)	Contingency budget, national reserves, annual budget allocation

Source: Adapted from Ghesquiere and Mahul, 2010

Implementing such a DRF approach for agriculture investments also allows for timely access to prearranged funding after a disaster, helping strengthen the fiscal resilience of the Government to crisis and disasters by improving the speed and quality of government's public expenditures.



Source: World Bank (2021)

The main considerations related to vulnerability assessment and basis risk mitigation. Given the complex environment in DRC, is important to properly assess the vulnerability aspects, that go beyond the direct connection between weather shocks and yield impacts. Market prices and trade patterns also have a role to play in regulating the income levels of farmers depending on their reliance on own production or purchased food. At the same time, DRC is a data poor country and the lack of historical evidence of relationship between weather impacts and yield shocks impacts negatively the quality of the correlation between parametric indices that can be used to trigger the risk transfer policy.

There are multiple benefits on agriculture investment projects from de-risking innovations using contingent financing. Faster time to respond to a disaster without threatening the achievement of project outcomes by avoiding the reallocation of amounts from other components into the emergency response. Ring fencing the protection of the investments done by project beneficiaries promoting the investment in climate and nutrition smart agriculture practices and technologies. Leveraging WB and donor funding to crowd in private capital to share the risk taken up by smallholder farmers in DRC through the use of risk transfer products (insurance/derivatives). Incentivize government to prepare ex-ante contingency plans to determine how the response and payouts will be done by using the underwriting process and risk-based triggers as behavioural change mechanisms.

The NADP and its contingency financing innovation will now allow DRC to move from only responding to shocks in an ad-hoc, ex-post fashion, to develop ex-ante contingency plans and plan financially ahead of disasters and crisis occurring, completely shifting the focus of its Department towards a more proactive role in safeguarding future investments by farmers.

Case Study: Burkina Faso's credit guarantee options

What was the intervention that was needed in Burkina Faso and why?

In Burkina Faso (Burkina) access to finance forthe agriculture sector is low, banks' lending to this sector represents only 4 percent of the overall loans portfolio. Although microfinance institutions (MFIs) are more engaged in financing farmers and agribusinesses, the loan portfolio of the microfinance sector for agriculture was around 15 percent in 2016. Several factors contribute to the limited appetite of financial institutions to lend to the agriculture sector, examples of these factors are issues such as lack of collateral for loans and the high risk of default from smaller more riskier farmers. The collateral requirements for banks in Burkina are high and can reach as much as 120 percent ofthe total loan value and consist mainly of fixed collateral, which can be limit access to finance as most individuals and small firms possess only moveable collateral. Producers and agricultural enterprises struggle to meet these stringent collateral requirements, as only 8 percent of agricultural households hold a legal land title.

Access to credit in the agriculture sector is particularly hampered by the sector's vulnerability to climate risks. Agriculture in Burkina is mainly rainfed where only 1 percent of land is irrigated. Rainfall conditions are strongly predictive of national crop output. In Burkina, rainfall is low, irregular, and poorly distributed resulting in regular droughts and increased food insecurity. According to the FinScope 2017 report, the level of household vulnerability is high, with two thirds of households reported to have suffered shocks each year. Droughts and floods represent the most severe climate hazards followed by price volatility and insecurity. Recurrent shocks reduce household income and erode the limited wealth of poor families.

Overview of credit guarantees – how is this instrument helpful?

Credit guarantee schemes (CGS) provide credit risk mitigation to financial institutions by accepting a proportion of potential losses on loans in case of defaults in exchange for an upfront fee. As only a part of the losses is absorbed, these are known as a partial credit guarantee schemes (PCGS). This type of intervention aims to incentivize lenders to provide financing to underserved segments such as SMEs or agriculture producers. By minimizing the financial institutions' risk in lending to this group of clients, guarantees can enable these institutions to revise their lending terms, reduce the amount of collateral required, revise their interest rates, and thus provide credit to clients that would not otherwise qualify for these loans. Worldwide, credit guarantee schemes amount to an estimated US$1.8 trillion.[3]

There are two key design features of CGS, the coverage ratio and the leverage ratio. The coverage ratio refers to the share of the losses which is covered by the CGS. If the coverage ratio is set too low, decreases the attractiveness for the financial institution (FI) to participate in this scheme as they are exposed to higher losses in case of defaults. This typically leads to restricted lending to more risky borrowers. Conversely, if the coverage is set at 100% where the full default risk is covered by the CGS, then FIs have no incentive to maintain high credit appraisal and monitoring standards, which can increase the number of 'ghost firms' or loans to unviable borrowers. It's important that the coverage ratio is high enough to attract FIs but it should not eliminate the risk entirely.

The leverage ratio is the extent to which the CGS allows investors (e.g. governments) to guarantee loans in excess of the capital of the scheme. The higher the leverage ratio the more loans the CGS can mobilize. This multiplier effect is a key contributor to the value of CGS as a key policy response instrument to crowd in private financial sector. A World Bank report[4] on 16 principles of public credit guarantee scheme provides further guidance on critical design elements of the CGS to ensure its sustainability and success.

In order to encourage financial institutions to lend to the agriculture sector, the Government of Burkina Faso (GoBF) established a partial portfolio credit guarantee (PPCG) as part of the Financial Inclusion Support Project (FISP) with capital ofUS$55 million. This PPCG has a dedicated window for the agriculture sector with an endowment of US$15 million, a coverage ratio of 70% and a leverage ratio of 2.

[3] World Bank Blogs. May 2020. "Boosting Credit: Public Guarantees Can Help Mitigate Risk during Covid-19." https://blogs.worldbank.org/psd/boosting-credit-public-guarantees-can-help-mitigate-risk-during-covid-19.

[4] https://documents.worldbank.org/en/publication/documents-reports/documentdetail/576961468197998372/principles-for-public-credit-guarantee-schemes-for-smes

What were some key considerations when designing the credit guarantee scheme?

Data: Data is a key consideration in the design of a CGS requirement for robust risk modelling. In Burkina Faso the required data for designing such a solution is not systematically available and when it is available, the lack of granularity of the data, limits the uses of the data. Some examples where granularity may not be available is the distribution of loans by geographical location,non-performing loans by province / region, or the type of agricultural loan by categorization. Where some of these characteristics may be available, they are not uniform between participating financial institutions (agricultural production, agricultural processing, marketing of agricultural products, etc.). To overcome this challenge, the project team at the WB, provided technical assistance to assist in ways that better standardise the data collected within PFIs.

Technical capacity: Technical capacities in this field of work around CGS are limited in Burkina Faso. Therefore, strengthening the capacities of national stakeholders should be an integral part of the process in setting up a sustainable CGS. The technical capabilities need to be considered from the feasibility analysis throughout to the design of the solution.

Risk transfer to protect the CGS: A CGS covers all credit-related risks from a portfolio of loans. Where the borrowers of these loans are exposed to climate hazards (for example droughts in Burkina), the credit portfolio of the CGS will be exposed to large-scale credit losses which threatens the sustainability (or expansion capabilities) of the portfolio in the event of a climate shock. This is where insurance can be utilised as a risk transfer product to protect the CGS, lenders and borrowers. In Burkina, making funding available to PPCG particularly during and after shocks is essential to encourage financial institutions to lend to assist in recovery. Therefore, there is a need to protect and inject additional resources to PPCG endowment in the aftermath of shocks. Given Burkina's vulnerability to shocks and limited fiscal space, the country is exploring an insurance arrangement to backstop the agriculture window of the PPCG. This will require significant analysis to understand the relationship between significant perils and non-performing loans.

Insurance market and regulatory framework: The capacity of insurance companies to carry out and regulate this kind of risk is another key consideration. In the CIMA[5] zone, the level of capitalization of insurance companies and the retention / cession rate have been revised upwards. However, given the type and size of the product envisaged (i.e. an insurance product to cover catastrophe risk), this requires significant capacity amongst insurers. For Burkina, this has meant that there was discussion initiated early on with the insurance industry and insurance regulators.

[5] The ConférenceInterafricaine des Marchésd'Assurances (CIMA) is a regional insurance oversight body established in 1992 to harmonise insurance regulation for a group of mainly francophone countries in sub-Saharan Africa. Its 14 members are: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo Brazzaville, Equatorial Guinea, Gabon, Guinea Bissau, Ivory Coast, Mali, Niger, Senegal and Togo.

How does this product interact with other risk finance instruments?

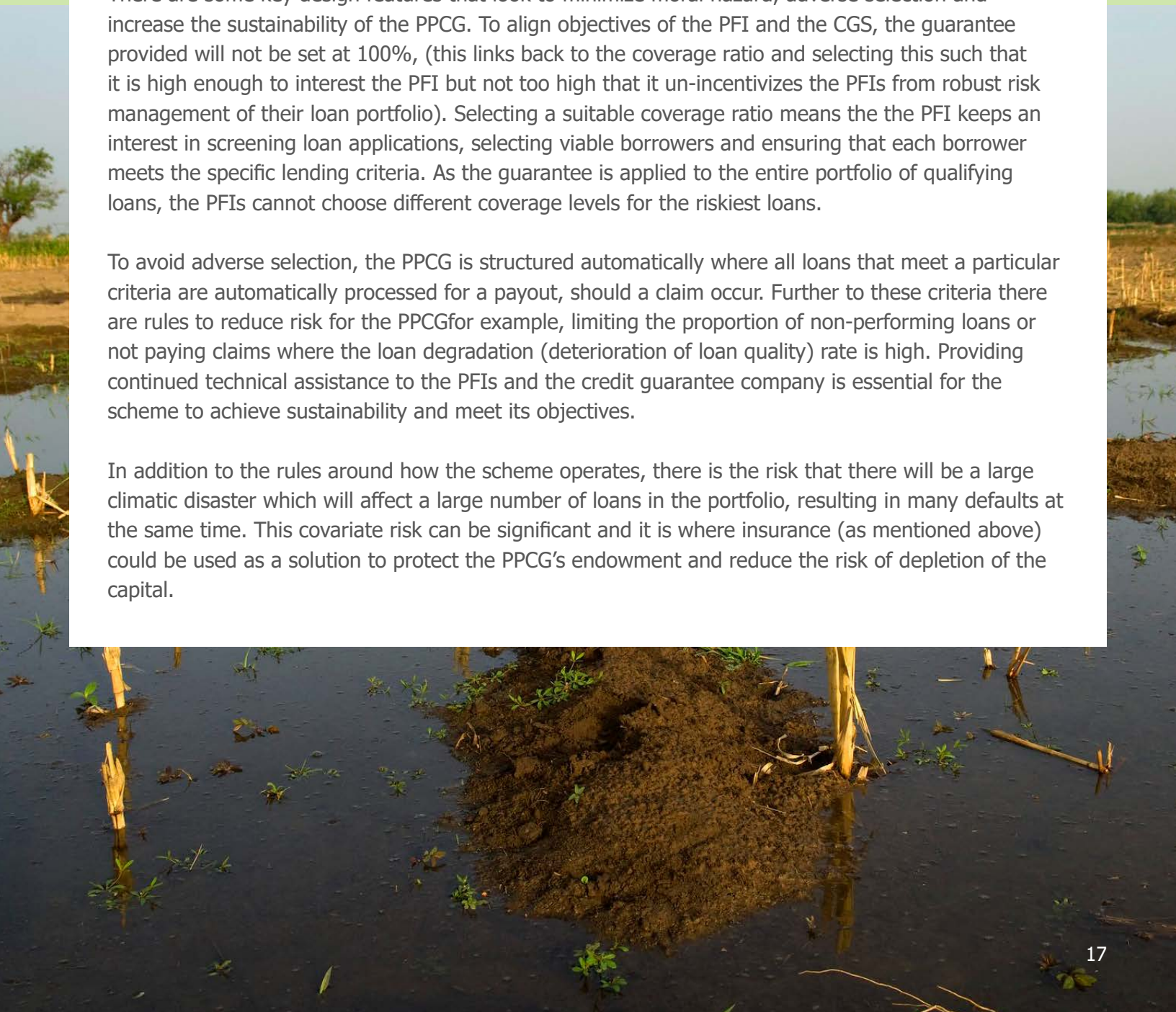
Burkina has several mechanisms in place to respond to disasters, for example: a social protection program that targets the poor and vulnerable segments of the population. Since 2020, a national index insurance agriculture pilot program has been launched with around 400 producers. This pilot program and thesocial protection program are not however linked to access to credit for vulnerable households. The diversity of risk instruments available in country calls for a disaster risk finance strategy, which will ensure that different instruments are layered appropriately and provide comprehensive protection to government, individual and households and MSMEs. A DRF diagnostic in Burkina is under implementation at the time of writing.

How to ensure the product meets its objectives?

There are some key design features that look to minimize moral hazard, adverse selection and increase the sustainability of the PPCG. To align objectives of the PFI and the CGS, the guarantee provided will not be set at 100%, (this links back to the coverage ratio and selecting this such that it is high enough to interest the PFI but not too high that it un-incentivizes the PFIs from robust risk management of their loan portfolio). Selecting a suitable coverage ratio means the the PFI keeps an interest in screening loan applications, selecting viable borrowers and ensuring that each borrower meets the specific lending criteria. As the guarantee is applied to the entire portfolio of qualifying loans, the PFIs cannot choose different coverage levels for the riskiest loans.

To avoid adverse selection, the PPCG is structured automatically where all loans that meet a particular criteria are automatically processed for a payout, should a claim occur. Further to these criteria there are rules to reduce risk for the PPCGfor example, limiting the proportion of non-performing loans or not paying claims where the loan degradation (deterioration of loan quality) rate is high. Providing continued technical assistance to the PFIs and the credit guarantee company is essential for the scheme to achieve sustainability and meet its objectives.

In addition to the rules around how the scheme operates, there is the risk that there will be a large climatic disaster which will affect a large number of loans in the portfolio, resulting in many defaults at the same time. This covariate risk can be significant and it is where insurance (as mentioned above) could be used as a solution to protect the PPCG's endowment and reduce the risk of depletion of the capital.



Overview of macro-level index insurance as a risk transfer product for agriculture

As discussed earlier the macro-level index insurance will be the focus of this session. A macro-level weather index insurance contract (sometimes referred to as sovereign insurance) is typically purchased by a government or national agency.

In the event of a payout under the contract, the government receives a lump sum payout which, at its discretion, it may use, for example:

To manage liquidity gaps in its budget;	To maintain government services (e.g. Haiti after the 2010 earthquake);	To finance post-disaster programs and relief efforts for affected populations who are either identified after the event or for target groups which have been pre-identified before the event.

At its most effective, macro insurance is linked to clear planning before disasters occur so that disaster response can be supported, with clear activities to be funded, and well-defined roles, and responsibilities.

As the beneficiaries (i.e. farmers) do not receive a direct guaranteed benefit from the insurance policy purchased by government, macro-level insurance is often referred to as an "indirect insurance approach". Even though the beneficiaries may not directly receive payouts there are social benefits to having this type of risk transfer product in place.

Some examples of macro-level insurance programs are:

Mexico (2003) CADENA (crop & livestock), ARC (2014 – in 2019-20 drought insurance in 11 African countries + humanitarian organizations); Kenya (2015-KLIP: livestock-pasture); Ethiopia (2017-SIIPE: livestock-pasture), these programs achieved commercial scale

Ethiopia (2006 – crop drought), Malawi (2010- maize-drought, these programs were pilots that are no longer active

Rationale of using Macro-Level Index Insurance to finance disasters

The benefits of macro-level insurance come from transferring an unknown cost (i.e. losses) into a known premium. For index insurance in particular, payouts are determined based on a pre-agreed index, this means that the payouts are determined objectively and can be delivered quickly after an event. This results in a range of benefits both economic and social. Some more detailed examples of these benefits are shown below.

Direct welfare benefits: There is consistent evidence that regular reductions in household consumption due to recurrent crisis has a direct impact upon child nutrition. A study by the World Bank (Hill et al, 2019) analysed high frequency data collected during six droughts in eastern and southern Africa. This showed that (on average) nutrition decelerates more rapidly between five months after harvest until 11 months after the start of harvest. It is further estimated that the cost of not getting a response in place in time to meet the consumption needs of those suffering from drought reduces income per capita (GDP) by 3.9%. A study on African insurance mechanisms suggested the cost of drought to a household can increase from $0 - $50 if support is delayed by four months, and could increase up to $1,300 if delayed 6 -9 months. Insurance can provide payouts quickly in the event of a disaster which can decrease the costly impacts to households of a delayed response.

Pre-empts negative coping strategies: Disasters exacerbate poverty since the poor and those vulnerable to poverty are forced to resort to negative coping strategies which often have long-term, irreversible and sometimes intergenerational effects. Research in Ethiopia has found that the vast majority (85%) of households cope with drought and other shocks by reducing food consumption (Vargus et all 2016).Many others (39%) sell assets including productive assets such as livestock. Other research has found that where households choose not to sell productive assets (or do not have them) they cut their consumption to dangerously low levels. The delivery of chronically late cash and food assistance on a repeated basis, means the resilience of poor communities and households is continually undermined, and poverty deepens. In Fiji, the government used its Government to Person (G2P) payment program to disburse F $19.9 million (US$10m) emergency relief to households within four weeks of a typhoon: an impact evaluation (Mansur 2018) found that after three months, assisted households had recovered to pre-crisis levels and were far less affected than households who had not been reached.

Reduces the cost of response: The wider economic case for early response has also been the subject of several studies on the economics of early response in recent years. Some of these studies have estimated the direct financial costs of an early "no-regrets" response versus late "wait and see" humanitarian responses. A study (Venton et al. 2012) on the economics of early response and resilience in Ethiopia found that a late humanitarian response costs approximately seven times that of an early response. A recent USAID study[6] found that donors could save 30 per cent on humanitarian aid spending if investment was provided earlier via systems such as adaptive social protection.

Macro-economic impact: The macro-economic impact of disasters can be enormous particularly where response is delayed hence impact and losses are greater. Further, sudden decreases in public investment can disrupt budgetary planning and may lead to projects being abandoned at various stages of development, thus making funds less effective. It has been shown that this instability has a clear negative impact on growth in Sub-Saharan Africa (Museru et al., 2014).

Different types of macro-level insurance products

Similar to meso level insurance products, there is considerable flexibility in the design of macro-level insurance products to achieve different objectives. To illustrate this, some international examples are discussed below.

International example 1. CADENA MEXICO: Federal and State Government use of Index Insurance to protect subsistence crop and livestock producers against natural & climatic disasters.

Overview: Mexico was the first country in 2003 to introduce macro-level crop and livestock index insurance products under the Component for the Attention of Natural Disasters (CADENA) program. This was an ex-ante approach to financing government social safety net programs for small and marginal producers against catastrophe natural and climatic disasters. Mexico was one of the first countries to recognize the opportunities for using macro-level catastrophe climatic agricultural index products as a social safety net product for small subsistence farmers for whom commercial crop insurance is not necessarily an appropriate or cost-effective mechanism.

[6] The economics of resilience to drought (USAID, 2018)

What are the risks covered?	Catastrophe Climatic Risks (drought, excess rain/flood, frost, windstorm (hurricanes) for crops – weather index and AYII covers for a wider range of crops; drought leading to lack of pasture and grazing for livestock; hurricane and allied perils index insurance for small-scale fisherfolk.
Who are the beneficiaries?	Subsistence crop and livestock and aquaculture/fisheries producers who do not have access to formal bank credit and commercial agricultural insurance products.
Method of distribution	State Governments purchase cover on behalf of eligible subsistence farmers who are registered at the local municipality level. The premiums are financed on a 20:80 ratio between state and federal government. Four private commercial insurers and the state reinsurer Agroasemex tender for business on an annual basis. Claims payouts are made to the State Governments who are then responsible for disbursing payouts to affected farmers in each insured location
Scale of program	Over time the program scaled-up massively to provide national coverage: • In 2011, the program covered about 2.5 million small-scale subsistence crop and livestock producers or 56% of the total of 4.5 million producers in 31 states • The insured area was about 8 million hectares of crops out of 16.5 million hectares and with 4.2 million head of insured livestock. • At its peak CADENA assumed several billion dollars of liability with government premium financing in excess of USD$ 200 million per year. • In 2020 Government suspended CADENA pending review and reforms to make it more cost-effective.
Positioning alongside other risk financing	CADENA protects subsistence farmers who are not insured by commercial insurers or by the FONDOS (mutual agricultural insurance) programs. Between 2003 and 2020, Government of Mexico largely substituted the traditional ex-post natural disaster compensation scheme with ex-ante parametric insurance products and programs under the CADENA umbrella.
Lessons learned	Evaluation studies have shown that the CADENA program • Helps stabilise marginal and subsistence farmers consumption and incomes until the next season • Enables beneficiaries to increase their expenditure by about 27% and their incomes by about 38%; • Although index insurance is expensive, benefits exceed costs (de Janvry et al 2016)

International example 2. Kenya Livestock Insurance Program (KLIP): Macro-level pasture NDVI index insurance as a social protection cover for the vulnerable to protect their core livestock assets against starvation in severe droughts since 2015.

Overview: KLIP is a macro-level pasture-drought NDVI insurance cover for vulnerable pastoralists providing payouts in the event of a drought.

What are the risks covered?	KLIP uses satellite imagery to protect pastoralists against severe droughts that lead to widespread depletion of forage and grazing resources and the death of livestock due to starvation. KLIP is based on the Normalised Difference Vegetative Index (NDVI). KLIP aims to make timely payouts to pastoralists to enable them to purchase fodder and feed supplements to keep their livestock alive until the drought has passed and pasture and grazing conditions return to normal.
Who are the beneficiaries?	Vulnerable pastoralists who will each receive direct cash payouts in any month which is triggered by the drought index. (The index that is used is the normalised difference vegetation index or 'NDVI')
Method of distribution	The (modified) macro-level policy is purchased by the State Department of Livestock of the Ministry of Agriculture, Livestock and Fisheries (SDL-MALF). SDL is responsible for identifying and selecting vulnerable pastoralists in collaboration with the County-level administrations and local community leaders. SDL finances 100% of the premiums. Local insurance companies tender for KLIP on an annual basis. Each pastoralist has a registered bank or mobile money account and in the event a payout is triggered, SDL-MALF have agreed that insurers will make direct transfers of payouts to each of the beneficiaries' accounts.
Scale of program	KLIP was launched in the short rains season 2015-16 with 5,000 pre-targeted and registered vulnerable pastoralists in 2 counties. The program has been scaled up in subsequent years and currently protects about 20,000 vulnerable pastoralists in 8 counties of northern Kenya.
Positioning alongside other risk financing/ risk management	KLIP was purchased as part of the national drought risk management strategy by the government. This risk transfer product was part of an overall disaster risk financing strategy which sat alongside other instrument such as the World Bank Cat DDO and a social protection program. The government also promoted voluntary sales of other livestock insurance policies to pastoralists.

As shown above in the international examples, macro-level insurance can be structured in various ways to support different beneficiaries in being more resilient to agricultural production shocks. The African Risk Capacity (ARC) is an example of a macro-level insurance pool which is another way to structure a macro-level solution. The next section provides a deep dive into this program.

CASE STUDY: ARC Limited

Why did ARC choose to design a macro insurance product?

ARC's Vision:
ARC was founded strategically to be positioned as the developmental partner and insurer of choice, leading innovating Pan-African Disaster Risk Management solutions. This is implemented by ARC Agency, a specialized agency of the African Union (AU) whose mandate is to help its AU member states to prepare, plan and build resilience against climate related natural disasters at a sovereign level.

ARC Structure:
By establishing ARC Ltd, as a financial affiliate of the ARC Group which offers risk pooling and parametric risk transfer solutions, ARC is able to tackle the low insurance penetration and high protection gap within the Africa continent. A macro parametric insurance product allows the opportunity for governments to insure vulnerable livelihoods for natural disasters, where local traditional insurance can only cover a small number of farmers.

Benefits of Risk Pooling:

Operating Costs – Enables benefiting from economies of scale lowering operational costs

Cost of Capital – Lower reinsurance costs due to better strWuctured and diversified portfolio. This also allows for capital preservation through joint reserving to retain aggregate losses.

What problem was ARC looking to solve with the product?

Normally when disasters strikes most households resort to negative coping mechanisms. Countries that do not have pre-arranged response mechanisms appeal for humanitarian aid from the international community. This process takes long before funding can be available to the government during which time livelihoods and lives are lost.

ARC's vision envisaged narrowing the gap between disaster strike and response by building state-of-the-art disaster risk monitoring tools that enable seasonal monitoring and determining the impact of the disaster and being able to provide immediate liquidity through parametric insurance taken by governments to help save lives whilst awaiting resource mobilisation from the international community and other humanitarian actors.

What were the key design considerations in the sovereign macro product?

Africa Risk View

ARC uses a drought monitoring tool called Africa Risk View (ARV). The objective of ARV is to estimate the number of people affected by a drought event during a rainfall season and then the dollar amount necessary to respond to these affected people in a timely manner. To do this, ARV translates satellite-based rainfall information into near real-time impacts of drought on agricultural production and grazing using existing operational early warning models; by then overlaying this data with vulnerability information, the software produces a first-order estimate of the drought-affected population, and in turn response cost estimates.

Satellite Rainfall Data

To satisfy criteria of transparency and objectiveness required for a parametric insurance contract, ARV uses dekadal (10-day) cumulative rainfall estimate data to compute the model's drought index. The default dataset used in ARV is provided by the U.S. Climate Prediction Center (CPC), National Oceanic and Atmospheric Administration (NOAA). Called RFE2, the dataset relates to specified grid cells, or pixels, across the African domain. Alternate rainfall estimate datasets available in ARV include ARC2, CHIRP and TAMSAT, which are available starting from 1983 and are also produced every dekad and available in ARV at the same spatial resolution.

WRSI Index

ARV converts the rainfall dataset the user has selected into a drought index called the Water Requirement Satisfaction Index, WRSI, which is an indicator of crop performance based on the availability of water to the crop during a growing season. The index captures the impact of timing, amount and distribution of rainfall on staple annual rain-fed crops. Originally developed by the United Nations Food and Agricultural Organisation (FAO), studies have shown that WRSI can be related to crop production using a linear yield-reduction function specific to the crop in question. WRSI is calculated at each pixel, as per the input rainfall data. The index is a number that can range from 0 to 100, where 100 indicates no water deficit for a crop and therefore no expected water deficit-related reduction in yield from optimal levels. A number less than 100 indicates some water deficit stress and therefore some expected yield reduction as a result; 0 indicates a situation where not enough rainfall was received during the season to successfully plant a crop at all.

Population Affected by Drought

In order to determine if drought conditions at the end of a season are "abnormal" and therefore if it can be considered that there is a drought, the aggregated WRSI at the end of a rainfall season (hereafter WRSI) is compared to its "expected" level in the polygon (hereafter Benchmark). In its default settings, ARV uses the median WRSI value of the previous five years as the Benchmark for a polygon. Comparing each WRSI value to its location-specific and time-specific reference allows converting an "absolute" drought severity into a "relative" drought severity, which is measured by the WRSI/Benchmark ratio (hereafter Drought Ratio). Once the WRSI is compared to its Benchmark as explained in the section above, and the "relative severity" of a drought in a polygon is defined, the next step in the ARV methodology is to convert this information into a drought-affected population estimate for that polygon. This is done by comparing each Drought Ratio to a polygon-specific Vulnerability Profile to determine the impact of that particular drought in terms of number of affected people in that polygon.

Modelled Drought Response Cost (MDRC)

The final calculation step within ARV is to calculate response costs for the estimated populations affected. Of all the calculations in ARV, response cost is by far the easiest, as the approach simply involves multiplying the estimated populations affected by a response cost per person – although the response cost per person may vary by polygon if appropriate. As such, the final response cost per person per season used in ARV will necessarily rely on conclusions from a country's ARC operations planning activities as well as discussions on the current costs associated with responses beyond those covered in the operations plan and by other actors, particularly in the case where an ARC pay-out will cover a smaller fraction of the costs required to respond to a drought event.

Risk Transfer Parameters

For insurance purposes ARC's macro product is structured in such a way that the member states have flexibility in selecting the parameters for risk transfer that suit their national budgets and their risk transfer preferences. This entails the following:

Attachment Point: Which represent the minimum response costs at which ARC insurance will begin triggering payouts. The minimum attachment return period for ARC is set at a 1-in-4 years.

Exhaustion: This is the maximum response cost at which ARC coverage will cease triggering payouts above the attachment point. At the exhaustion point the maximum payout possible is triggered.

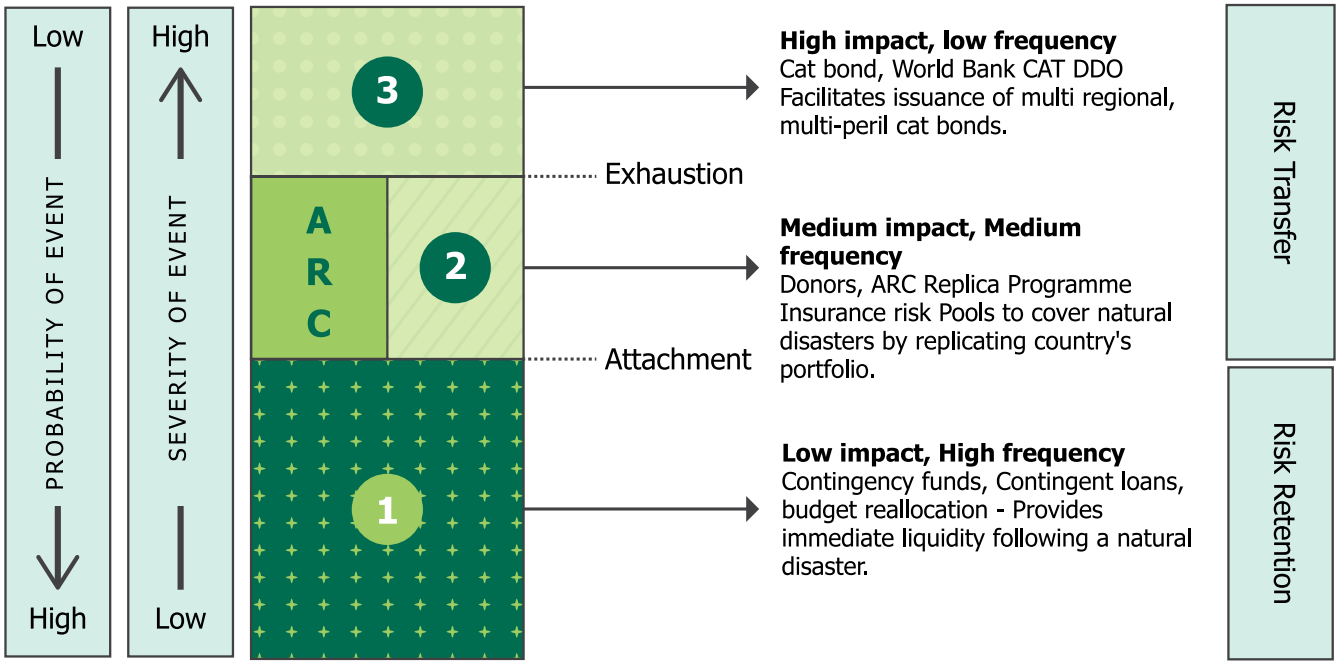
Coverage Limit: This is the maximum payout possible under ARC's parametric insurance, it is equivalent to the sum insured in traditional insurance contracts.

Ceding Percentage: This represents the amount of risk ceded to ARC Ltd. Most member states can not afford to cede 100% of the risk between the attachment point and the exhaustion point since this makes the policy relatively expensive, thus the ceding percentage represents the ratio of the maximum insured sum (the coverage limit) to the difference between the exhaustion and the attachment point.

Contingency Planning

In order to take out insurance from ARC Ltd, a country must develop a contingency plan outlining the use of any ARC Ltd insurance payout in case of a disaster. With advisory support from ARC, the country develops an operations plan that meets the Certificate of Good Standing (CGS) Standards established by the ARC Governing Board. ARC works with in-country technical experts in emergency response and social protection to explore existing contingency funding mechanisms and response activities in the country that could be complemented and used by ARC payout and to consider supporting the scaling-up of existing social protection programmes. These plans must go through independent reviews to by experts in contingency planning and humanitarian response as well as the Peer Review Committee of the ARC Board to assess their feasibility before they are approved by the ARC Governing Board. Through its work, ARC can help protect gains made under these regular programmes from being wiped out by weather-related risks.

How does this product interact with other risk finance instruments?



ARC has partnered with Afreximbank which is aimed at providing alternative disaster risk management tools below the attachment point risk layer where ARC insurance does not trigger payouts. The product(s) will be able to attach below attachment return period.

ARC is also exploring the design of additional complementary products to cover below attachment and above exhaustion point to ensure that countries have a menu of products that they can use to implement a holistic disaster risk financing strategy.

How to ensure the product meets its objectives?

This is achieved through quality control (achieved through minimum standards detailed in 1 to 3 in the diagram below) and continuous improvement.

1. A minimum benchmark of five years:

- Credible indicator for the detection of droughts
- Higher duration benchmarks reduce the volatility of the risk profile

2. Using rainfall dataset starting from 2001:

- Validating the impact of disasters in the 1980s is difficult and adds uncertainity into the model
- Shift in agricultural practices over time

3. Minimum attachment level of 1-in-4 years:

- Greatest benefit from insurance is obtained when used to protect high impact events

4. Quality Assurance and Basis Risk Management:

- Improved model customisation and validation processes
- Using most recent data to reduce basis risk

5. Independent Loss Calculation Software:

- Enables easy detection of errors

6. Product ownership for the Member States:

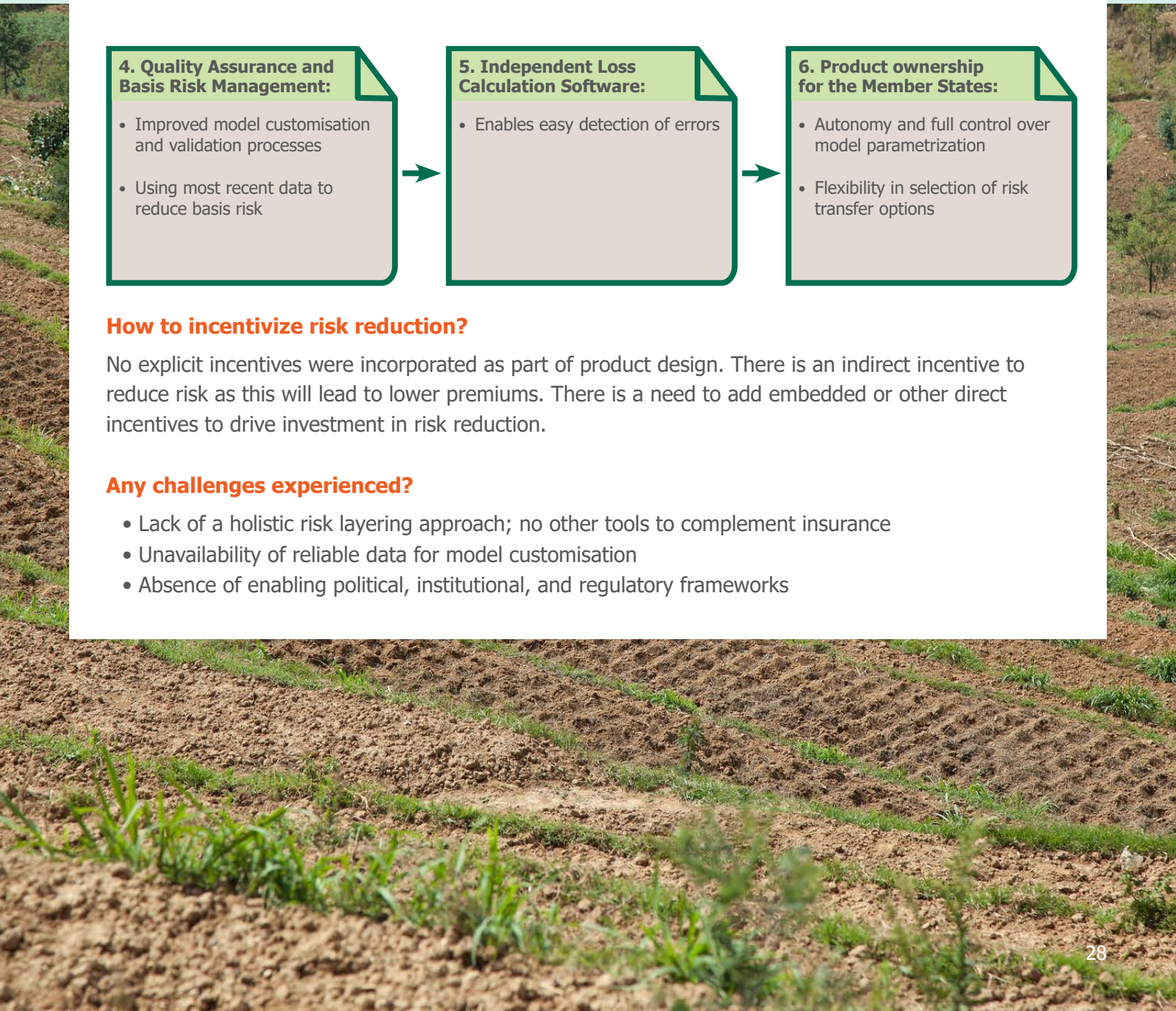
- Autonomy and full control over model parametrization
- Flexibility in selection of risk transfer options

How to incentivize risk reduction?

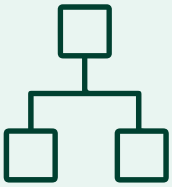
No explicit incentives were incorporated as part of product design. There is an indirect incentive to reduce risk as this will lead to lower premiums. There is a need to add embedded or other direct incentives to drive investment in risk reduction.

Any challenges experienced?

- Lack of a holistic risk layering approach; no other tools to complement insurance
- Unavailability of reliable data for model customisation
- Absence of enabling political, institutional, and regulatory frameworks



Lessons and Conclusions



Macro and meso-level risk transfer programs can be structured differently to achieve different objectives such as: ensuring supply of financial services after disasters, reducing basis risk relative to micro insurance, or protecting aggregators or other value chain actors. The benefits and tradeoffs depend on the specific design of the program.

Meso and macro-level index insurance can be used to manage basis risk compared to micro insurance. However, like any other index insurance product, there remains high potential for basis risk and so it is critical to ensure that the index and payout distribution is designed carefully.

Partial credit guarantee (PCG) schemes provide a direct way of protecting financial institutions from credit risk, including that from disasters. This can be used in place of, or alongside insurance for of agricultural borrowers to increase willingness and ability to lend for productive activities. PCGs do not typically face basis risk in the same way as index insurance, but schemes must be very carefully designed to manage moral hazard and covariate risks.

Design of meso and macro risk transfer programs should consider: the specific challenges and risks faced by target beneficiaries; collection and effective use of data to understand risk and determine payouts; the roles of aggregators, the financial sector, and government; and financial education of beneficiaries and other key stakeholders.

Worksheet 7 – RISK FINANCE INSTRUMENTS: MACRO AND MESO-LEVEL RISK TRANSFER FOR AGRICULTURE

Test your knowledge and record your insights through this easy, do-it-yourself (DIY) worksheet!

Activity 1: Referring to the content covered in this worksheet, identify which of the following statements are true or false.

	Statements	True	False
1.	Index insurance and credit guarantees relate to managing production risks for the key stakeholders involved.	◯	◯
2.	Parametric index meso-insurance policies are held by an institution to aggregate demand of members such as a farmer's association taking out a policy to protect its member farmers.	◯	◯
3.	Credit guarantees are used to alleviate credit constraints and provide access to finance for certain segments of the market who remain largely underfunded.	◯	◯
4.	Basis risk is an important issue to consider in the design of any index insurance product.	◯	◯
5.	Compared to micro level index insurance, meso and macro level index insurance have higher administration and operational costs.	◯	◯

Activity 2: A List of statements is given below. Identify which statements describe macro index insurance and which statements describe meso index insurance, some statements may apply to both.

Statement	Macro level	Meso level
1. The purchaser of the index insurance is an aggregator (such as bank, cooperative, or inputs provider).	☐	☐
2. The purchaser of the index insurance is the government.	☐	☐
3. This index insurance is also referred to as disaster risk insurance.	☐	☐
4. The objective of the index insurance is associated with the limiting the non-performance of loan portfolios of aggregators, distributors or banks.	☐	☐
5. The beneficiaries in this type of index insurance are often referred to as "indirect" beneficiaries as they do not receive a direct guaranteed benefit from in the insurance policy.	☐	☐

Activity 3: Can you identify three advantages and three constraints in implementing macro level index insurance in your country?

	Advantages	Constraints
1.		
2.		
3.		

Activity 4: Reflections

[1] These are the most important things I learned from this Fact Sheet.

[2] Here are two concepts or ideas about which I would like to have more information.