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# Crop insurance in developing economies – the insurers’ and reinsurers’ perspective

Appropriate risk management tools for agriculture will be a key challenge for agricultural development in the future. One of these – crop insurance systems – has been successfully implemented in the last decades, mostly however in industrialised countries. To introduce them in developing countries and emerging markets too, a system approach is needed incorporating a public-private partnership between the government, the farmers and the insurance industry.

Crop losses due to extreme weather events are a common phenomenon in agriculture, including losses in developing countries and emerging markets. The majority of these losses – estimated

at 70 to 80 percent – are attributable either to a lack of rain or excess of moisture (either rain or flooding).

In many developing countries, farmers operating all sizes of farms retain the risk of crop losses. Their risk management mainly consists of diversifying their income sources by planting a variety of crops and breeding cattle. They have hardly any risk-

transfer tools, which in turn limits the availability and range of agricultural production credit offered by banks. Therefore, the development of sustainable risk management systems and tools – one of them being agricultural insurance – will be a key topic in future agricultural development strategies as well as in climate change mitigation strategies (see also article on pages 8–10).

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### ■ System approach before product approach

In the discussion on agricultural insurance in developing countries and emerging markets, it is misleading to look for the solution at product level first and foremost. The problem of appropriate risk management tools in agriculture cannot be solved with an insurance product alone – neither an index-based insurance product nor an indemnity-based insurance product. This is why none of the proposals of index insurance over the last few years have resolved the problem of a lack of risk management tools in developing countries.

This is not necessarily due to the type of product, but to the lack of implementing the adequate framework that any insurance product needs. In other words, a system approach has to be pursued first, and before the question of which insurance product is appropriate. Such a system approach creates the adequate legal, institutional and organisational framework in which insurance products and other risk management tools can work efficiently. This means that the challenge involves developing national agricultural insurance systems corresponding to the specific needs of the different production sectors and addressing the interests of all stakeholders (producers, government, lending institutions and insurance industry). The objectives of such a crop insurance system are to make insurance covers available to the majority of production sectors and to farmers.

### ■ SystemAgro – Key success factors for sustainable crop insurance systems

Munich Re has systematically compiled the elements of sustainable crop insurance systems under the name of SystemAgro ([www.munichre.com/systemagro](http://www.munichre.com/systemagro)). The key success factors are:

- Ability to respond to the heterogenic structures in the crop production sector (e.g. large-scale, medium-sized and smallholder farms as well as different production sectors) and provide individual risk management solutions to each of them. Sustainable production methods and the use of best available production techniques are a prerequisite of insurance. Co-operation with extension services might be beneficial.
- Crop insurance systems to be organised and financed as public-private partnerships between the government, farmers and the insurance industry. The role of these stakeholders is as follows:
  - **Government:** provide legal framework, define agricultural insurance as part of national agricultural policy, co-financing the risk premium and administrative costs, risk carrier for catastrophic losses. Premium subsidies and state reinsurance of catastrophic losses contribute to keeping insurance terms affordable for the farmer, thus facilitating a large market penetration and the stability of the programme. In developing countries, where state institutions may not have enough resources, some of these tasks might be assumed by international organisations.
  - **Farmers:** financing part of the risk transfer (insurance premium), retaining part of the risk in form of a deductible or, with index products, as a basis risk and applying site-specific and sustainable production methods and techniques in order to minimise production risks.
- **Insurance/reinsurance industry:** risk carrier, marketing and administration of insurance policies, portfolio and product development, loss adjustment.
- Joint market approach by all insurance providers and risk carriers, e.g. in the form of a coinsurance pool. In such a pool, all crop risks of one country or even several (smaller) countries are combined, thus creating a better spread of risk. This joint market approach includes market-wide uniform insurance terms and conditions which are technically sound and applied by all insurance providers. This is a very important element to guarantee the sustainability of the system.
- Centralised technical entity run by the insurance industry which bundles the technical expertise, maintains an extensive database, and carries out loss adjustment according to standardised procedures and methods.
- Integrate financial institutions like rural banks as well as agricultural input, output and extension service providers (including co-operatives) in order to promote and market the insurance products efficiently.

*The majority of crop losses are attributable either to a lack of rain or excess of moisture.*



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*Index insurances based on meteorological data bear the risk that the crop-loss of the individual farmer, particularly the small-scale farmer, may not be taken sufficiently into account.*

### ■ Index insurance: The overestimated potential for individual farmers

In the last few years, index insurance based on meteorological triggers was promoted as the solution. These policies pay out if a specific meteorological value, e.g. precipitation, is not achieved or is exceeded in a specific period – independently of the actual yield. The fact that this kind of insurance leaves a considerable basis risk with the individual farmer was simply overlooked. This is due to the relatively low correlation (as low as 60 %) between trigger and actually harvested yield and the fact that only one or – in the best case – two natural hazards are covered. This has resulted in situations where the farmers have suffered considerable crop losses without the policy indemnifying – a situation which is disastrous for the farmer as well as the insurance industry because of the loss of confidence and acceptance amongst farmers and government representatives.

Another problem arising from index insurance is that the farmer, especially the smallholder farmer, does not understand and cannot trace the real mechanism of the cover. To give an example: smallholder farmers very often don't really know how many millimetres of rainfall is needed for a decent crop. As a consequence, demand by farmers for such covers has generally been much lower than anticipated by the promoters of index insurance.

Consequently, index insurance based on meteorological triggers should be offered to individual farmers only under clearly defined conditions: thorough understanding by the farmer of the mechanism of index insurance and the basis risk involved; financial capability of farmers to bear the basis risk.

This does not mean that index insurance might not play a role in risk transfer for the agricultural sector. Area yield index insurance for instance has proved to work for smallholder farmers under certain conditions (catastrophic

losses, homogeneous regional production potentials), too. The potential for covers based on meteorological triggers, however, lies more at aggregate level than at the level of individual farmers. Instead of covering the individual farmer, the cover should apply at aggregate level, e.g. for covering a crop credit portfolio or a portfolio of a co-operative. Under these circumstances, the basis risk can be absorbed by the aggregating body. The problem regarding how to distribute indemnification in case of losses to the individual lenders or co-operative members still has to be solved, e.g. by providing individual covers to them.

### ■ Microinsurance – the new paradigm in crop insurance?

With the development of microfinance in the last decade, microinsurance has been developed and promoted strongly as well. Nevertheless, so far, neither microfinance nor microinsurance (defined as finance/insurance designed for low-income people/busi-

#### Insurance products at a glance

| Product type   | Perils covered                                       | Advantages   | Disadvantages   |
|--|--|--|---|
| <b>Direct loss insurance</b><br>Fixed-sum insured<br>Variable-sum insured                  | Single perils, named perils (e.g. hail, fire, frost) | Sum insured eligible within certain limits; loss adjustment on percentage loss basis | Loss adjustment in the field necessary  |
| <b>Yield guarantee insurance</b><br>Regional yield guarantee<br>Individual yield guarantee | All climatic risks as a package                      | High correlation between yield loss and indemnification; all climatic risks covered  | Yield guarantee difficult to fix properly; individual loss adjustment in form of yield estimation/field recording necessary |
| <b>Index insurance</b>   |  | No individual loss adjustment necessary, thus lower operational costs                | Basis risk involved; high development costs (except area yield trigger)   |
| Meteorological trigger   | One to two selected perils only                      |  |   |
| Area yield trigger   | All climatic risks as a package                      |  |   |
| Vegetation index (remote sensing)  | Only indirect  |  |   |
| Multiple factors in production model   | Selected perils only                                 |  |   |

## Crop insurance loss adjusting and management

Crop Insurance programmes in developing countries and emerging markets are normally limited to weather-related, named perils, until the programmes stabilise and accumulate sufficient supporting data to justify more advanced programmes. Crop losses are either adjusted using a conventional percentage of loss formula, which compares the original crop to the remaining crop after damage, or a weather index formula with a trigger mechanism designed to pay losses when insured weather risks inhibit normal crop development.

Both conventional and indexed policy forms require basic confirmation of an insurable crop, actual planted area, and cause of loss. Conventional policy forms still require a physical inspection of the insured parcel to adjust the loss, whereas an indexed-based policy adjustment is an automatic calculation based upon recorded weather data at the nearest authorised weather station. Indexed policies have become very popular as an efficient method to offer crop insurance coverage for many small farms in developing countries and emerging markets, but are still limited by distribution density and reliability of the weather stations needed to record the data.

### ■ Without accurate information no insurance

Accurate information is the key to properly adjust any crop loss, and it is important to develop the human, technical assets necessary to collect, validate, and interpret the relevant information. The ultimate success of the programme will depend upon the selection of the adjusters, the quality of the training they receive, and the existence of clear and concise loss guidelines and crop production standards for the insured crop.

Both conventional and indexed policy forms require inspections to adequately document initial insurability, crop development, proper management, and actual cause of loss. Uninsured causes of loss may include improper management, uninsured perils, theft, and in many cases, the

feeding of the crop to livestock or personal consumption.

Limited resources require innovative practices, and substantial progress has been made in the use of sophisticated satellite imagery programmes with the capability to measure planted area, monitor crop development, and to some degree determine the rainfall volumes and percentage of crop damage remotely. It is still necessary to physically visit the insured area, to give it the electronic address (GPS co-ordinates) needed to identify the specific parcel on the satellite image, and also to calibrate the satellite image characteristics with the actual field conditions.

Growing season and loss inspections may be accomplished using a combination of satellite images and physical, onsite inspections. For index programmes, the onsite inspections also provide an opportunity to verify proper operation of the weather stations and proximity to insured farms; confirming the data being reported is accurate and relevant to the insured risk.

### ■ Creating a base of confidence between farmer and insurer

While the onsite inspections provide necessary information, they also serve to

develop a relationship with the farmers to better understand their management abilities and as an opportunity to gain their confidence by helping them understand the insurance programme and by helping to keep them within the guidelines throughout the growing season. Adjusters selected for programmes in developing countries and emerging markets need a strong agronomic background, but they also need the patience and ability to communicate with farmers who may have a very limited understanding of the policy coverage they have purchased and who may become extremely emotional when their crops are damaged.

The loss adjustment process goes more smoothly if it is clearly and tactfully explained, and it is much easier to accomplish if a working relationship and base of confidence is established with the farmer and farming community prior to crop loss.

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*Onsite inspections are necessary to obtain accurate information but also to develop a relationship with the farmers.*



Photo: Agro International

### Examples of crop insurance systems in emerging markets

Crop insurance systems were developed in the last years/decades in various emerging markets and are nowadays an important risk management tool for farmers. The systems mentioned all come within the framework of a public-private partnership. Market penetration is still unsatisfactory.

|                              | Brazil (data of 2009)  | India (data of 2005)   | Mexico (data of 2009)  |
|------------------------------|--|--|--|
| Cultivated area (million ha) | 38.0 (soybean, corn and wheat)   | 142.0  | 26.5   |
| Insured area (million ha)    | 4.6  | 27.8   | 1.9  |
| Market penetration           | 12 % (soybean, corn and wheat)   | 20 %   | 7 %  |
| Number of insured farmers    |  | 16.5 million   |  |
| Market premium               | 208 million euros  | 93 million euros   | 80 million euros   |
| Premium subsidies            | 104 million euros or approx. 50 %  | 50 % approx.   | 47 million euros or 58 %   |
| State reinsurance            | In start-up phase  | at 100 % L/R for crops group 1, at 150 % L/R for crops group 2   | Mainly for the "fondos de autoaseguramiento"   |
| Insurance product types      | Yield guarantee (50 %, 60 % or 70 % of regional yield)   | Index products: mainly area yield with coverage levels 60 % to 90 %; in the last years also meteorological trigger policies as pilots            | Direct loss yield guarantee  |
| Main insured crops           | Soybean, corn, wheat   | Food crops and oilseeds (group 1) and annual commercial/horticultural crops (group 2)  | Corn, wheat, sorghum   |
| Operating since              | 2006   | 1985   | 1990   |
| Comments                     | System in development; presently an appropriate government reinsurance lacking; market penetration estimated to increase to 31 % by 2014 and to 67 % by 2018 | Rates presently not set actuarially and system therefore technically unbalanced. Cover is available for all farmers; compulsory for credit users | High market share (58 % of premiums and 63 % of subsidies) of "fondos de autoaseguramiento", a form of collective crop insurance organised as a mutual |

nesses not served by typical social or commercial insurance schemes) have made their way into the area of crop production. Although this is not surprising, it is often not realised because rural microfinance/insurance normally does not include crop production.

To serve smallholder farmers with much needed capital via production credits, a joint effort by different sectors is necessary. Microfinance institutions play a vital role in this process, but they will be successful only if they integrate their efforts with input and output mar-

keting services along the agricultural value chain. Furthermore, the (micro) finance and insurance industry as well as the government need to form a public-private partnership (see also article on pages 11–13).

#### ■ New remote-sensing technologies will enhance crop insurance

Nowadays, remote-sensing technology for agricultural applications is rapidly developing: plot identification,

yield estimations as well as assessment of loss events and vegetation status are only some examples which will enhance crop insurance and other risk management tools (see also pages 24–25).

Once it is possible to determine yields accurately with remote-sensing technology, yield-based coverages might be feasible also for smallholding farming. Furthermore, insurance products using a remotely-sensed vegetation index will gain further importance, especially in covering extensive farming, e.g. grassland.

### Zusammenfassung

Geeignete Risikomanagementinstrumente für die Landwirtschaft werden künftig ein wichtiger Faktor für die Entwicklung des Agrarsektors sein. Eines dieser Instrumente, nämlich die Ernteversicherung, wurde in den letzten Jahren erfolgreich eingeführt, jedoch hauptsächlich in den Industrieländern. Nur Konzepte, die auf einer Public-Private-Partnership basieren, haben sich als erfolgreich und nachhaltig erwiesen. Dagegen sind rein private oder rein staatliche Konzepte gescheitert. In diesem Beitrag

wird erläutert, warum auf Public-Private-Partnerships beruhende Ernteversicherungen künftig an der Spitze der Entwicklung in Entwicklungs- und in Schwellenländern stehen werden.

### Resumen

Los instrumentos apropiados de gestión de riesgos en la agricultura constituyen uno de los desafíos clave para el desarrollo agrícola futuro. Uno de dichos instrumentos – los sistemas de seguros para cosechas – ha sido implementado con éxito en las

últimas décadas, aunque sobre todo en los países industrializados. Sólo los sistemas basados en cooperaciones público-privadas (PPP) han demostrado ser exitosos y sostenibles. En cambio, los sistemas exclusivamente privados o sólo organizados por los gobiernos han fracasado. Este artículo describe las razones por las cuales los sistemas de seguros de cosechas basados en cooperaciones público-privadas liderarán la evolución de estos instrumentos en los países en desarrollo y también en los mercados emergentes.