

Filling stomachs worldwide with agriculture risk transfer solutions

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The combination of severe production shortfall, extreme weather conditions and export controls heightens threats of a global food crisis. By any measure, this is not an easy problem to tackle, especially since there are too many unknowns at play.

Roman Hohl, head of agriculture for reinsurer Swiss Re's Asia Pacific business, believes that agriculture risk transfer products can play a useful role in managing volatility in agricultural production. He was speaking at a recent seminar organised by **Singapore Management University's** International Trading Institute (ITI@SMU)

Hohl, who holds a doctorate in atmospheric science from Switzerland's University of Fribourg, has extensive experience in the reinsurance industry. He helped create new risk transfer products for the agricultural sector at Swiss Re, involving insurers, governments and corporations such as food processors, banks and logistics companies.

Zurich-based Swiss Re, with a century and a half of history behind it, has grown to become a leading reinsurance company with an innovation track record in fields of parametric risk transfer products, insurance-linked securities, such as catastrophe bonds, and agriculture risk transfer.

Today, the company operates in some 20 countries, including this part of the world. "We are the only reinsurance company with agriculture people on the ground in Asia," said Hohl, whose team comprises five experts across Singapore, Beijing and Mumbai.

Yawning demand and supply gap

Food consumption, estimated to be growing at 2.5% per annum, is not merely driven by population growth – likely to hit 9.2 billion by 2050. Along with growing prosperity, people are eating at a pace 50% faster than gains in their real income. The consumption mix is changing too, as wealthier consumers consume more protein such as meat and milk. This has had the effect of driving up demand for livestock feeds (e.g. grains).

Furthermore, the growing production of bio-fuels – a bid to stem the over-reliance on crude oil – has also driven up demand for the same group of grains to the tune of 8% a year, creating further competition. Some governments have resorted to export bands, thus adding to shortage issues.

The supply side of the system has been struggling to keep up, managing only 1% growth per year. Coupled with limited arable land, degrading soils, compounded by increasing urbanisation and falling water tables, inventories have fallen to record low levels. Clearly, supply cannot be boosted overnight. Extreme weather events create volatility to supply too, and climate change can drastically impact yields. A one-degree increase in temperature is estimated to reduce yields by 10% on average.

From El Nino to La Nina

With the change from strong El Nino to La Nina weather conditions last year, droughts, floods and cyclones have destroyed crops, causing grain productions worldwide to drop 2%. Water and energy issues can also disrupt food supply, adding costs to fertiliser production and agricultural machinery. Meanwhile, supply chain inefficiencies are not helping. Hohl estimates that 10% of grains harvested are lost by the time they hit supermarket shelves. To tackle this widening demand and supply gap, the United Nations' Food and Agriculture Organisation has projected that US\$44 billion in investments may be needed each year to grow production. It is also estimated that agriculture production has to increase between 50-70% by 2050 in order to feed a growing population.

Farmers are especially vulnerable to fluctuations. Those with good harvests benefit from high prices. For those who experience losses in production, the future is highly uncertain. The sector lacks investment, and very often, there is no protection against the loss of income, said Hohl.

Obviously, failed crop production in any given year can have a large impact on countries where agriculture is a major contributor to GDP, and where it employs a large proportion of the working population. There is clearly a role that agriculture insurance can play.

Shifting from subsistence to commercial

The key function of agriculture insurance is to protect farms from income loss. Peace of mind can presumably foster greater investment within the sector. Ultimately, higher output can be achieved as production shifts from subsistence to commercial farming. Hohl observed that demand for agriculture risk transfer solutions has been increasing. In mature markets such as North America, Europe, Australia and parts of Latin America, governments strongly support agriculture insurance through premium subsidies, and there is high insurance penetration.

Governments in emerging markets such as the BRIC nations and Southeast Asia have also jumped on the bandwagon, increasingly commissioning and supporting implementation with significant government subsidies to make insurance affordable. This marks a shift from a post-disaster ad-hoc financing model to pre-event risk management. While North America today remains the biggest agriculture reinsurance market, emerging countries, such as China and India, are increasingly adopting such products.

Mature markets typically have farm-based indemnity-based covers, with loss adjustments done by qualified professionals. However, because of small farm sizes in Asia, mature market concepts of insurance – meant for large single farms – are difficult and costly to administer. Therefore, new risk transfer concepts, based on yield or weather indices, have been created. However, there might be a basis risk since the specific risks faced by an individual small farm might not be completely covered.

From India to Vietnam to Malawi

Such products are not merely figments of some actuaries' imagination. They are already put in use. For example, In India, some 20 million farmers benefit from yield- and weather-

index insurance covers to cover production shortfalls of 36 crop types in two growing seasons.

Significant growth has occurred with the Indian government providing premium subsidies to make the products affordable for farmers. The government has also made it a rule that insurers have to generate a certain percentage of premiums written with the rural sector, which provides an incentive for insurance companies to invest in technology and to work with farmers.

In India, Swiss Re has been helping private sector insurance companies to start with weather index insurance. It is also the leading supporter of the state-owned Agriculture Insurance Company of India that writes a majority of the yield- and weather-based index covers.

Over in Vietnam, Swiss Re's area yield index is also used by Agribank, a leading, state-owned provider of agriculture loans, as well as ABIC, its insurer. The bank was, however, plagued with bad loans resulting from natural disasters and pestilence that affected farms that borrowed from the bank. In several rice-growing districts, bad loans were as high as 20%, and with potentially more frequent and severe natural hazards, Agribank might not be able to offset such growing losses against government funds.

What Swiss Re did was to customise an area yield index to cover the three rice seasons annually against natural perils, with payout occurring when actual yields fall below a guaranteed level for each district and season. Insurance policies based on this index are then sold by Agribank agents to some 500,000 rice farmers.

While base risks remain, lenders can now actively manage loan default risks by transferring them to the insurance sector and can confidently offer future loans using the insurance as collateral. In a country of 86 million people, 50% of whom are involved in farming, this solution has provided a means by which Vietnam's key sector sustains growth. Malawi is another notable example. With farming accounting for 42% of its GDP and 70% of the jobs, agriculture is obviously a critical sector of its economy. Even though corn, the main crop, relies heavily on rainfall, irrigation systems serving this crop are not quite sufficient. Severe droughts can lead to a massive and immediate drop in GDP, increased domestic borrowing, triggering emergency interventions of corn imports, which had consumed some 4% of GDP in bad years such as 2003 and 2005.

Faced with such dire situations, the Malawi government approached the World Bank to set up a risk management scheme. A weather index programme was created, and is playing the role of the counterparty to the Malawi government, while Swiss Re, in turn, is a key counter party to the World Bank through a weather derivative structure. This arrangement allowed Malawi greater fiscal stability.

From racehorses to frost

Agriculture producers are not the only beneficiaries covered by companies like Swiss Re. Players further down the chain can be covered too. For example, when harvests fail, food processors may face over-capacity and producers may default on their deliverables. Even

banks might face growing default risks on credits granted to businesses linked to food production. Yield index covers protect against the risk of natural perils, pests and diseases, while weather index covers insure against severe weather events, such as frost, excessive rainfall and droughts.

A survey done by Swiss Re with food companies has shown that while risks around commodity prices, foreign currencies, interest rates and business interruption aspects at production sites are actively managed, many food processors have concerns about sovereign risk and impacts of severe weather events that cause increased earning volatilities.

Besides crops, risk transfers can also protect livestock from epidemic diseases, bloodstock such as racehorses from mortality and transportation risks, forests from fires and storms, and aquaculture, from natural catastrophes and diseases. In short, the coverage available can be quite extensive.

The typical underwriting process relies on computational models, which uses historical loss data and proxies for losses such as weather conditions around which uncertainty and expected losses are modelled with the use of distribution functions. According to Hohl, Swiss Re's products are typically short term insurance where the potential claims arise within six months, and hence longer term trends such as climate change are not yet included into their models.

"Swiss Re's widely diversified operations globally also help it to diversify its risks, since exposure to any particular country is limited. We actively use the capital market to transfer peak risks from natural hazards such as earthquakes and typhoons in the form of insurance linked securities and are as such pioneers in this type of risk transfer," he said.

Swiss Re offers two main classes of reinsurance: proportional reinsurance, where they share the gains and losses with their insurer clients, and non-proportional reinsurance, where payouts are made to the insurers after a pre-determined amount of losses are exceeded. An example of non-proportional reinsurance is found in China, where since 2007, the government has been implementing subsidised crop and livestock insurance, on top of agriculture insurance.

Swiss Re, in 2009, structured a reinsurance solution where losses up to 160% are retained by the insurers who, in turn, draw on the surrounding regions of Beijing. Beyond that threshold, reinsurance picks up the tab. This is the first time that reinsurance deal has been put in place by a Chinese government at the provincial level and today, this programme benefits some 400,000 farming households.

As it is, the breadth and level of sophistication of the coverage will increase. There are enough case studies to show governments in emerging markets – especially those in Asia – that it is worthwhile working in tandem under private-public partnerships to protect their agriculture economy. More importantly, there is a shift from post-disaster funding to pre-disaster risk management, said Hohl.

End of the day, demand for food will only grow, even as the security of supply remaining susceptible to the same fundamentals. More investments are needed to increase



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production and improve efficiencies along supply chains. However, the fact is that many farmers are often unable to provide sufficient collateral to qualify for loans. Agricultural insurance can help stabilise farm income and act as collateral. Necessary investments can be raised and ultimately, this will lead to higher levels of production, he concluded.

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