An insurance recipe for the Chinese food and agricultural industry
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The Four Seasons

During the summer of 2007, the flooding of Huai River devastated 1.8 million hectares of arable land in the Henan, Anhui and Jiangsu provinces, resulting in a CNY 7.5 billion loss of economic value. (Translated from BBC Report Chinese.Com, 7 December 2007)

From September to November 2007, Hubei faced a once-in-a-50-year drought. In the Wuhan region, total rainfall was below 50 mm after 50 days. The fall drought significantly delayed the sowing of oil-bearing crops and wheat by 70%. (Translated from China Broadcasting Portal, 31 October 2007)

Mr Zhang, who operates an egg farm in Jinshan, Hubei, invested CNY 50,000 to repair its production facilities, which were destroyed during a summer rainstorm. However, the once-in-a-100-year snowstorm during the winter blocked outbound traffic. Mr Zhang could not sell the eggs and said, “I’ve approached many insurance companies, but they were unwilling to offer me an insurance policy. They said my business was too risky. I hope the Government can offer us a subsidised scheme.” (Translated from Economic Information Daily 27 February 2008)

Northern China began the spring of 2008 with the worst drought in five years. As of 26 March, 49 million hectares of crops had been affected. Farmers also had trouble feeding 5.4 million livestock. Total rainfall in some areas was below 10 mm. (Xinhua Beijing, 26 March 2008)
By any standard, China is one of the world’s largest agricultural economies. According to the United Nations, China produced about one-fifth of all cereals, one-third of meats and a quarter of fruits and vegetables in the world in 2004. However, its agricultural sector is under-insured; the agricultural insurance market represented just 0.2% of the agricultural GDP in 2007.

Insurance can play a vital role in stabilising the agro-food economy. With the appropriate regulatory environment and enabling infrastructure under the heading of Public-Private Partnership, recent innovations in agricultural insurance products and reinsurance arrangements have enhanced risk management ability and capacity in many countries. By reducing volatility and hence uncertainty of their outputs, farmers will have much more confidence. The agriculture industry and other parties along the value chain can insure themselves against the unexpected shortfall of inputs and control volatility in earnings. The government can partner with the insurance industry and plan for the best use of its disaster relief budget. Stakeholders, including agriculture insurers, farmers associations, NGOs, government ministries and insurance regulators, are brainstorming the way forward.

As the thought leader of global reinsurance and a licensed reinsurer in China, Swiss Re can contribute to the discussion by combining Swiss Re’s international experience in this field with its understanding of the local issues. This publication aims to offer evidence-based recommendations for the Chinese agricultural insurance sector and policymakers.

In early 2007, Swiss Re decided to enrich its understanding of the agro insurance system in China. Leveraging on the research capability of Swiss Re’s Economic Research and Consulting unit and the global expertise of its Agriculture unit, as well as the local knowledge of its Beijing Branch, a multi-disciplinary study team was established to identify the key issues of China’s agricultural insurance. Through working closely with academia, by visiting operators of the agriculture and insurance industries, and by exchanging views with policymakers and NGOs, the study team has enriched Swiss Re’s understanding of the latest regulatory and market developments as well as the risk landscape facing China’s agriculture value chain.

This report is structured as follows: Chapter 1 provides an overview of China’s agricultural sector and its risk landscape. The focus of Chapter 2 is agricultural insurance in China, where the objective is to identify key issues in the current system including the value chain. Chapter 3 describes agricultural insurance in other countries and risk management with respect to each of the issues identified in the previous chapter. Lastly, the report will offer some recommendations in Chapter 4, which Swiss Re believes can contribute to China’s plans to advance its agricultural insurance system.

Swiss Re looks forward to the establishment of a successful risk protection system for Chinese farmers.
Feeding 1.3 billion in a time of change

Food has emerged as a major political and economic focal point in the world. 2008 began with a number of stylised facts with respect to global agriculture and food – many of which are China-related:

- Corn prices climbed to USD 6 per bushel on the Chicago Board of Trade in April, compared to USD 2.25 two years ago, partly reflecting the increasing use of crops for biofuel – stimulated by high oil prices – and the speculative activities in the commodity markets.
- In China, pork prices climbed 63.4% and vegetable prices increased 46% in February. Food prices overall surged 23.3%, contributing more than 80% of the 8.7% increase in the Consumer Price Index (CPI), the highest since May 1996.
- Japanese police said pesticide was found in bags of dumplings imported from China. In order to ease food safety concerns, officials in China organised a visit for the Japanese and foreign media to the factory producing the dumplings.

Many of the recent events reflect the underlying challenges facing the world’s agriculture and food system today, which is increasingly globalised and specialised, and to some extent politically more strategic than ever. On the supply side, some countries intend to restrict agricultural exports in order to secure their own reserves. What’s more, urbanisation in many emerging markets has already caused dissipation of arable lands and lowered farm yields. Furthermore, climate change has escalated the adverse impact of natural perils, pests and diseases. On the demand side, the growth of agribusiness has prompted companies to source and procure globally. The energy sector is also competing for crop outputs to produce biofuel. On the supply side, the pressure is strong to cope with the increase in global demand. Speculative activities have only added to the problem by increasing the market volatility of crop commodities.

Against this background, China’s agricultural and food industries today are under constant scrutiny. The reality is that China’s rapid economic development is fundamentally changing the way the country feeds its 1.3 billion inhabitants. The challenge facing China is not one of sufficiency, per se, but one of adapting to its rising economic prosperity. By international standards, the average Chinese has already reached the saturation point for carbohydrates. With increasing wealth, however, the demand for non-grain items – i.e. fruit, meat, and seafood – has also risen. According to a development plan released by the State Council, the average Chinese will consume 10% more meat, 26% more eggs, 33% more vegetables, 37% more seafood and 190% more milk between 2000 and 2010. Over this period, the intake of grain is expected to decline 25%. (See Figure 1)


1 State Council, China Food and Nutrition Development Framework (2001–2010)
Accommodating this shift in diet will require significant effort. On a per capita basis, more resources (ie land, facilities, labour) will be required to meet the additional production of non-grain products than those freed up by reducing grain production. From 2005 to 2020, China will add another 100 million people to the world’s population.² Between 1996 and 2006, rapid urbanisation and environmental conservation resulted in dissipation of arable land by 6%. In 2003 alone, total arable land fell by 2%. The result is a strong overall rise in potential food demand in the coming decades – a trend that is observed globally.

The shift in demand towards more meat will not relieve the pressure on grain inputs. It is estimated that 8 kg of grain are needed to produce 1kg of beef.³ Over the past two decades, China’s grain output has typically been 400 million to 500 million tonnes, with only three bumper years – 1996, 1998 and 1999 – when output exceeded 500 million tonnes. This is despite an 84% jump in fertiliser inputs and a 16% increase in irrigated areas between 1990 and 2006. A recent research paper estimates that total grain output in China will need to rise to 580 million tonnes by 2010, 620 million tonnes by 2020, and nearly 700 million tonnes by 2030 to satisfy demand.⁴

The lack of a visible uptick in production during this period is a warning that, given the current capacity, the gap between food supply and demand will widen considerably in the future. Analysts predict that China will become a net importer of grain over the next few years.⁵ Increased production is most likely to come from higher yields, improvement in seed and fertiliser quality, and advancement in production techniques.

Transitioning from collectivism to a modern value chain

Against the backdrop of escalating food demand, China’s agricultural sector is becoming increasingly important. Prior to the economic reform of the late 1970s, crops and agricultural outputs were produced by Production Troops, which were organisations set up by the Communist Party to conduct rural economic activities in the era of collectivism. From 1958 to the early 1980s, China’s agriculture sector was state-owned. However, with the introduction of the Households Production Responsibility System in 1979, the agricultural sector began to embrace market economics through a series of reforms. In May 2004, the State Council issued the “Opinions about further deepening the reform of food distribution systems”, confirming the use of markets as the basis for procurement of agricultural outputs. All of these efforts set the stage for China’s agricultural sector to transition to an economic value chain.

Figure 2
Size of China’s agricultural industry

<table>
<thead>
<tr>
<th>Year</th>
<th>Agricultural Gross Output Value, USD bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>100</td>
</tr>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2006</td>
<td>300</td>
</tr>
<tr>
<td>2007</td>
<td>400</td>
</tr>
</tbody>
</table>

**Sources:** China Agricultural Development Report 2007; Swiss Re Economic Research & Consulting estimates

2 United Nations Population Division, Data Online
3 The Economist, “The end of cheap food”, 6 December 2007
4 Mei Fang Qun, Strategic Options for China’s Food Development in Early 21st Century, China Academy of Management Science
5 Reuters, “Storms shine spotlight on China grain import policy”, 7 February 2008
Today, the size of China’s agricultural sector is estimated at USD 650 billion (see Figure 2). Statistics show that in 2004 China was at the top of the table with the highest share of the world’s production in cereals (18%), meats (29%), fruits and vegetables (37%) and fertilisers (22%). The government’s focus has been on expanding production in order to increase rural income. Since 2004, growth has been remarkable. Farming represents about half of the agricultural sector’s activities; animal husbandry, fishery and forestry account for the remainder. The shift in demand towards more meats and fish will have a significant impact on the fishery and animal husbandry sector. China’s forestry sector is being driven by the increased demand from infrastructure for building materials and by real estate development.

Figure 3 illustrates a typical agricultural value chain in many market economies. China’s food supply system is likely to transition from the original collective approach to this market-based value chain system. While the growing of crops and livestock are still the focal points in agriculture, the value chain also includes upstream activities that provide necessary inputs, such as seeds and fertilisers, and downstream activities, such as processing, packing and distribution. Increased demand for food production is expected to spur investment in agricultural infrastructure such as equipment and machinery. The value chain also includes generic factor inputs, such as financing, labour and logistics.

China’s fast growing economy is not only fundamentally changing which foods the nation consumes, but also how foods are consumed. Urbanisation has increased the demand for more sophisticated food handling capabilities that can deliver even the most perishable products to faraway places, while keeping them edible for prolonged periods. As the agricultural industry becomes increasingly modernised and commercialised, China’s agricultural sector may witness further industrial changes at a later stage, including:

- Consolidation, with enterprises incorporating smaller farms into larger ones;
- Vertical integration, with companies involved in more activities along the value chain;
- Specialisation at various stages, from production (monocultures) to fertilisers to well-organised retail and wholesale networks.

Note: This figure is intended to capture the general situation of the agro-food sector. Specific outputs such as grain in different countries would be reflected differently in the value chain.

Source: Swiss Re Economic Research & Consulting

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6 Food and Agriculture Organization of the United Nations, FAO Statistical Yearbook 2005–06. Note that China’s share of cereal production has dropped slightly from 20.5% in 1989/91 to 18.2% in 2004 but its shares of meat and fruits/vegetables have increased from 17.1% and 18.5% to 28.5% and 36.6%, respectively.
China’s agricultural production across provinces has become increasingly specialised, with some crops produced mainly in selected regions. The potential demand for food and agricultural-related logistics across provinces is also significant. In 2008, logistic throughput of agricultural products is expected to reach CNY 1.8 trillion, which represents just 2% of total logistic throughput. Moreover, China currently lacks a modernised food transportation system. Also, on the retail front, supermarkets are increasingly popular; it is estimated that 50% of fresh food consumed by urban residents is distributed through supermarkets.7

**Downstream enterprises in the driver’s seat**

A phenomenon of this value chain development is the rapid proliferation of intermediaries that provide an increasing amount of added value in the delivery of agricultural products to consumers. These players differ in terms of the size of their operations (e.g., from individual food brokers to large food conglomerates to supermarket franchises) as well as in the services they provide (e.g., sourcing, processing, transportation, marketing, retailing and exporting).

The importance of these intermediaries is reflected by the rising significance of the agricultural-related processing industry. Figure 4 illustrates the gross output values of the agricultural production sector and that of agricultural sideline processing, one sub-sector within the intermediary segment. While agricultural sideline processing is underdeveloped from an industrial economy’s perspective, the sector virtually doubled in size between 2003 and 2006. Its gross output of CNY 2.2 trillion in 2006 was approximately half the size of the CNY 4.2 trillion agricultural sector and 8% of the country’s total industrial output (see Figure 4). The downstream activities grew faster than agricultural production.

**Figure 4**
Gross output values of agricultural food & beverage processing

![Gross output values of agricultural food & beverage processing](image)


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The growth of the sector is also supported by the “Dragon’s Head” enterprises, which were designated by the government as leading corporations in the agricultural/food sector in recent years. The term “Dragon’s Head” reflects their capacity to lead the overall economic development of the rural community. Currently, more than 580 of these organisations receive fiscal support from the central government. In the State Council’s “No.1 Document” in 2008, the government confirms its plans to modernise the sector through “agricultural industrialisation”. Policy measures include financial support from government budgets via interest subsidies, equity investment and tax incentives.

During the process of continued industrialisation, the private sector will continue to expand its role in the value chain. For example, a noticeable trend in food processing is the rise of private enterprises. Of the sales of food manufacturers in 2005, private enterprise accounted for about half of the total. This is in stark contrast to 2000, when private enterprises had a market share of only 36.7% (see Figure 5). This change is expected to strengthen the commercialisation of the entire value chain, which has been closely monitored and regulated by the government, given the political and economic importance of ensuring stable food prices and supplies. This trend is also attracting foreign investors who are trying to enter the domestic market and feed their global supply chains.

These developments in the food economy are by no means trivial, but a key step in China’s transition towards modern agriculture. The value chain represents a cluster of market institutions that strengthen the distribution of food from agricultural-centric rural areas to commercial city centres, as well as the flow of incomes. The result is a welfare gain for both, which makes urbanisation possible and rural self-reliance achievable.
Risk landscape of China’s agricultural supply

China is highly exposed to natural disasters and the potential impact of climate change. In a recent Swiss Re study on natural hazards in China\(^9\), it was estimated that major events, such as earthquakes, floods and typhoons, could trigger total economic losses exceeding CNY 1 trillion. This is equivalent to 6% of China’s GDP in 2005\(^{10}\). For instance, the Great Flood of 1998 that occurred between June and August affected major areas along the Yangtze River, and led to a high number of fatalities and significant economic losses. While heavy rainfalls have regularly triggered floods in China, their impact has been aggravated by the deteriorating eco-environment due to land misuses.

Over the past 10 years, natural perils (e.g., typhoon, frost, hail, flooding, and drought) have affected a quarter to one-third of arable land in China.\(^{11}\) These disasters are graded according to the level of crop loss: devastating (crop losses of 80% or more), severe (30–79%), and mild (10–29%). Between 1997 and 2006, 3–7% of sown areas experienced devastating events, while 8–19% of sown areas suffered severe damage. During the same period, 9–15% of sown areas had mild losses (Figures 6 and 7). As in many other countries, drought is a major threat to agriculture in China, particularly in northern, northeast and western China. On average, it reduces at least 30% of the crop outputs on 54% of Chinese farmland.

Figure 6

% of farmland affected by natural disasters by intensity level in China 1997–2006

Source: Swiss Re Economic Research & Consulting; data from National Statistics Bureau

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10 As insurance penetration, defined by life and non-life insurance premiums divided by GDP, remained at the low level of 2.9% in 2007, it seems that very little of the economic loss is protected by insurance.
11 The Ministry of Civil Affairs is responsible for coordinating the efforts of disaster relief. When there are major events, local authorities are required to assess the intensity of damages including crop losses. At present, the system captures five major perils, namely, drought, flood, hail, frost, and typhoon. This system provides a dataset that allows an initial assessment of weather risks across the country, providing information on the sizes of farmland affected by natural disasters with three levels of crop loss: 10% or above, 30% or above, and 80% or above.
If a drought is like a headache, then a flood is like a migraine to China. On average, floods affect 27% of farm land. When they occur, they affect wide areas and destroy a significant amount of crops in many provinces. Changjiang (Yangtze) River Basin has been affected by flood frequently. Sponsored by Swiss Re, Beijing Normal University put together a comprehensive atlas showing the risk landscape of natural disasters in China.12 It can be observed that the Great Flood of 1998 was responsible for almost 70% of farm losses. Jiangxi, Hubei, Hunan, Heilongjiang and Jilin were also significantly affected. In addition, Henan, Anhui and Jiangsu suffered flood losses in 2003.

Swiss Re estimated the amount of agricultural products damaged by a particular type of natural disaster using cause-of-loss data for Chinese provinces reported by the Ministry of Civil Affairs and crop production statistics for the provinces from the Ministry of Agriculture (Figure 8).13 In 2006, 14 million tonnes of rice, 12 million tonnes of corn and 6 million tonnes of wheat were destroyed by adverse weather. As a percentage of total output, natural disasters claimed 8% of five types of crops – beetroots, beans, tubers, corn and fibre.

12 Shi Peijun (2003), Atlas of Natural Disaster System of China, Science Press Beijing China
13 There is no official data in China that links specific perils to the loss of specific crops. Our estimation assumes that a peril proportionally affects the portfolio of crops of a province. This method captures the heterogeneity of crop profiles and variation in causes of loss across provinces.
Combining the economic value of each type of crop at the time of the loss, the total loss value of crop production can be estimated. Figure 9 shows Swiss Re’s estimate of the loss of crop values in China between 1997 and 2006. In 2006, it is estimated that natural disasters caused a CNY 170 billion reduction in the value of agricultural production. On average, 10% of crop values were destroyed.

Climate change could increase the frequency and/or severity of extreme weather. As a result, the production of crops and livestock, as well as the distribution of processed food to consumers can more frequently be disrupted. During the writing of this report, China faced one of the most severe snow storms in its recent history. Seventeen provinces from Zhejiang to Xinjiang were affected by snow, frost or hail. The natural disaster affected hundreds of millions of hectares of farmland and resulted in an economic loss of CNY 1 111.1 billion, including property and motor damage in urban and rural areas. Other coastal provinces that were not directly affected were packed with migrated workers who were delayed in railway terminals, stranded on highways and waiting at airports due to massive interruptions in transportation. Food supplies were temporarily blocked, further heightening inflationary pressure.

Source: Swiss Re Economic Research & Consulting estimates using data from China Agricultural Yearbook, China Statistical Yearbook
The dawn of risk management for agriculture and food

Policymakers have recognised the need to ensure the stability and sustainability of the whole agriculture system and food supplies amid China’s integration into the world commodity markets. The State Council, in its No. 1 Document of 2007, signals the government’s intention to construct an “agricultural risk prevention mechanism”, which includes the following components:14

1. Strengthening of the agricultural sector’s ability to monitor natural perils and undertaking preventive/mitigating measures against potential losses
2. Developing agricultural insurance under the principles of “guided by the government, supported by policies, and operated by the market, with voluntary participation by farmers”
3. Expanding the state-subsidised agricultural insurance pilot schemes to more regions
4. Improving the mechanism for the sharing and transfer of large catastrophe risks and exploring the development of a reinsurance system supported by central and local fiscal resources
5. Encouraging agricultural corporations and other intermediate institutions to promote agricultural insurance to farmers

Over the past year, the government has made many efforts to advance the development of an agricultural insurance system, including premium subsidy programmes for crops in six selected provinces and the launch of a breeding sow insurance subsidisation programme. These are the initial steps of what will likely be a long quest for a sustainable risk management regime, which from the experience of even the more developed countries, cannot be taken for granted.

The key question is whether the current policy direction fits the development of the agricultural economy, which will be going through a stage of rapid industrialisation and commercialisation. Risk management, in this context, goes beyond a narrow perspective of compensating weather-related losses of farmers; it serves the broader purpose of advancing protection for the various stakeholders (ie farmers, corporations, consumers) in a rapidly changing food economy and strengthening the food security of the nation.

The government’s recent efforts to promote agricultural insurance developments are a commendable step in mitigating the systemic risks of the sector. So far, most of the resulting initiatives are on a local scale and are heavily promoted and subsidised by the government at different levels. However, the long-term aim should be to turn these experiments into self-sustaining risk management platforms that can support the continued growth and transformation of the broader economy. Fulfilling this vision will require consideration of alternatives that go beyond simply compensating a farmer’s loss of income per se; it will also require consideration of other risky events faced by players in the various segments of the value chain. The focus of the next chapter is the development of agricultural insurance in China.

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14 State Council 2007/No. 1, “Opinions about proactive development of a modern agricultural industry and progressing the establishment of New Socialist Countryside”
2 Agricultural Insurance Development in China

History of China’s agricultural insurance

Agricultural insurance is not new to China because agriculture is considered a national pillar and is therefore strategically important to the stability of China. People’s Insurance Company of China (PICC), the state-owned insurer, began offering livestock insurance in the early 1950s. When China resumed its insurance operations in the 1980s, PICC again sold insurance policies covering livestock in Jiangxi, Heilongjiang and Hunan.

Crop insurance was offered in subsequent years. Over time, PICC has worked closely with local governments that have either co-insured or reinsured PICC’s agricultural portfolio. However, agricultural insurance products were largely unprofitable and Chinese insurers were reluctant to continue selling them. In stark contrast to the booming Chinese life and non-life insurance sectors, premiums from agricultural insurance fell from a peak of CNY 816 million in 1992 to just CNY 330 million by 2002.

The decreasing trend reversed in 2003 when various pilot subsidisation programmes were introduced. China United Property Insurance began a pilot project for rice, wheat and barley insurance in Xinjiang province. PICC has also launched 9 pilot schemes in conjunction with local governments. Since 2004, many specialised agricultural insurance companies have been created.

Even though free trade calls for the phasing out of farm subsidies, government support of agricultural insurance to alleviate the impact of natural disasters is exempt according to a 1994 World Trade Organisation rule. In China, subsidised agricultural insurance programmes have become an important element of rural support policy.

In June 2006, the State Council issued its Opinions about the reform and development of insurance industry. Among the ten opinions is a proclamation about the importance of insurance in national agricultural policy. This view was confirmed in the No. 1 Document issued by the State Council in 2007. No. 1 Documents have been repeatedly devoted to the San Nong Policy in recent years. The 2007 document called for developing a risk protection mechanism, including the promotion of agricultural insurance, and for expanding the coverage of pilot schemes by making use of premium subsidies and establishing methods to diversify catastrophic risks with financial support from the government.

In 2007, the central government spent in total CN¥ 2.1 billion on agricultural insurance subsidies. In early 2007, the government set aside CN¥ 1 billion for premium subsidies to match those provided by the provincial governments, with the aim of funding 50% of the insurance premiums paid by farmers in Jiangsu, Jilin, Xinjiang, Hunan, Sichuan and Inner Mongolia to cover five major crops, namely, corn, wheat, paddy rice, cotton and soybean. Later in the year, however, the central government allocated an additional CN¥ 1.15 billion for breeding swine insurance. The prevailing view is that premium subsidies broaden the coverage and deepen the penetration of the agricultural insurance sector. In 2007, 37 million or 80% of swine in China and 40–50% of sown area were covered by some form of government subsidised scheme. Total agricultural premiums, inclusive of government subsidies, were CN¥ 5.3 billion in 2007 (see Figure 10 below).

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16 “San Nong” is a Chinese acronym and refers to three aspects of the countryside: agricultural industry, villages and farmers.
17 Xinhua News Agency, 7 April 2008
Agricultural insurance has become an integral part of the central government’s strategy of building the New Socialist Countryside. In 2008, the No. 1 Document released by the Communist Party explicitly refers to the agricultural insurance initiatives highlighted in the 2007 document:

1. Product and coverage: “Through concluding the experience and practices of policy-oriented agricultural insurance schemes, to gradually expand the area of coverage and confirm what products are to be subsidised” and “To support the development of policy-oriented schemes for major grains” and “To improve policy-oriented schemes for swine and milk cows”;
2. Downstream activities of the value chain: “To support the development of export credit and guarantee insurance for agricultural exports”;
3. Reinsurance: “To improve the operational mechanism and development models of policy-oriented agricultural insurance schemes; to establish the reinsurance system for agriculture and to set up a risk transfer and pooling mechanism against natural catastrophes.”

At present, the regulator is working to formalise the practice of subsidised agricultural insurance. In 2008, the China Insurance Regulatory Commission (CIRC) has stated that the subsidisation programmes should be “led by governments, supported by policy, operated by the market, and adopted by farmers on voluntary basis”.

Figure 10
Agricultural insurance premium in China

Source: China Insurance Development Bluebook 2006; Nankai University study

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Features of China’s agricultural insurance

Reliance on Government subsidies

An important growth driver of China’s agricultural insurance was the introduction of premium subsidies in 2003 (see table below) for crop and livestock risks. Premium subsidies funded by the central government in 2007 further magnified the impact in that they also encouraged provincial governments to provide matching support. Subsidies have proven to be an effective means to promote agricultural insurance at this initial stage of development. They are essential to making crop insurance affordable for small farmers as well, especially when systemic perils with widespread effects (eg drought, flood, typhoon) are covered. In 2007, total claims payments for China’s agricultural sector totalled CNY 2.98 billion. If government subsidies (roughly 50%) had been excluded from the total premium figure in 2007 (CNY 5.3 billion), agricultural insurance would have incurred losses, due mainly to a drought in the northeast and typhoon losses in coastal areas. Anecdotal evidence suggests that certain province-based crop insurance programmes have loss ratios higher than 200%.

<table>
<thead>
<tr>
<th>Period</th>
<th>Government pilot programmes</th>
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<tr>
<td>Prior to 2003</td>
<td>Shanghai government subsidised (40–50%) mandatory epidemic livestock disease cover since the mid-1990s. The government also offers excess-of-loss cover for crops and livestock programmes through Anxin Agricultural Insurance Co.</td>
</tr>
<tr>
<td>2003–2006</td>
<td>In 2003, Huaian in Jiangsu Province piloted subsidised insurance (50%) for rice, wheat and barley. Aquaculture and personal accident were added in 2004.</td>
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<td></td>
<td>In 2005, Anhua Insurance Company in Jilin launched six pilots for corn, tobacco, strawberries, dairy cattle, pigs and poultry with high levels of government subsidy from 33–100%.</td>
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<td></td>
<td>In 2006, Zhejiang Province established a coinsurance pool, led by PICC, to underwrite crops, forestry, livestock, poultry and aquaculture with subsidy levels from 35–50%; provincial government provides catastrophe reinsurance for losses between 200% and 500% loss ratio. Similar pool arrangement is set up in Hainan Province with premium subsidy from 20–30%.</td>
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<tr>
<td>2007</td>
<td>Ministry of Finance at Central Government allocated CNY 1 billion to support development of subsidised schemes for rice, wheat, corn, soybean and cotton in Jiangsu, Jilin, Xinjiang, Hunan, Sichuan and Inner Mongolia and expected matching funds from provincial governments of another CNY 1 billion; total maximum subsidy level at 50%.</td>
</tr>
<tr>
<td></td>
<td>Central Government allocated CNY 1.1 billion to support national breeding sow insurance.</td>
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<tr>
<td>2008</td>
<td>Ministry of Finance is expected to expand the Central Government subsidy programmes to cover more provinces; oil bearing seeds, peanuts and dairy cattle will be included. Premium subsidy level increases: for crops, Central Government 35% and provincial government 25%; for national breeding sow insurance, Central Government 50% and provincial 30%; for cattle insurance, Central Government and local government 60% in total.</td>
</tr>
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Source: Various press reports; compiled by Swiss Re Economic Research & Consulting

Table 1
Pilot subsidisation programmes

As far as the primary market is concerned, local government officials are likely to continue the development of localised agricultural insurance schemes that are supported by subsidies from the central government. Different schemes will likely be adopted, reflecting regional differences in agricultural products, infrastructure and market conditions. Such a bottom-up approach results in numerous versions of subsidy schemes, echoing the State Council Opinion’s calls for developing an agricultural insurance system that is diverse and flexible in its design and number of distribution channels.

Voluntary participation under the current regulatory regime
China’s Agricultural Law stipulates that farmers should purchase insurance on a voluntary basis. At present, insurance business is supervised by CIRC under the Insurance Law, however, dedicated agricultural insurance laws have yet to be promulgated. Clause 155 of the Insurance Law Supplement section stipulates that “Insurance business related to agricultural production that is supported by the country, or, agricultural insurance, will be governed by another law or regulation”. The government has not developed “another law or regulation” since then. As of the writing of this report, CIRC had not introduced regulations for agricultural insurance, but had issued a publication titled “Guideline for Good Practice of Agricultural Insurance: Protecting the Stable Development of Agricultural Industry and Food Production in 2008”. CIRC is also working closely with other ministries to draft an ordinance for the agricultural insurance subsidisation programme.20

Premium subsidies by the Chinese government can help to nurture an insurance culture in the agricultural sector and raise the awareness of risk management among farming communities. The importance of insurance as a financing tool is duly recognised by Chinese leaders as preferable to post-disaster fiscal relief. At the same time, subsidy-matching schemes (where local authorities match subsidies offered by the central government) offer incentives for the local government to develop risk protection solutions for the rural community. Though coverage and penetration of agricultural insurance will continue to grow in the coming years, wealthier provinces, or those with bigger stakes in agriculture, will probably lead the development.

New agricultural insurers tend to be home-grown, government-backed and regional
Another contributor to the strong recent growth of agricultural insurance premiums is the formation of new entities that specialise in carrying out agricultural insurance business, though PICC, the largest national property & casualty insurer, is still playing the dominant role in China’s agricultural insurance in terms of premiums received. Governments, especially the provincial governments, play an important role in leading agricultural insurance development. Local governments and enterprises closely associated with them have taken the lead in developing the business. Shanghai Anxin Agricultural Insurance Company, formerly a regional branch of PICC, was set up by a group of enterprises owned by the municipal government and municipal committee and subsequently took over the agricultural portfolio of the listed PICC in Shanghai in 2004. Sunlight Agricultural was inaugurated as a mutual company from Heilongjiang Reclamation Group in the same year to offer government-subsidised agricultural insurance programmes. Similarly, Anhua Agricultural Insurance Company was formed by a syndicate led by Jilin Grain Group that was created by the provincial government in 2005 to conduct six pilot programmes for crops and livestock in the province. China United Property Insurance Company is owned by Xinjiang Production and Construction Corps, which promotes the economic development of the provinces. The organisation extended its agricultural insurance underwriting to other provinces in 2003, including Jiangsu and Sichuan. As this report was being written, Guoyuan Agricultural Insurance Company was founded in Anhui and started writing business. Groupama, a French insurer, was also allowed to offer rural insurance products to Sichuan farmers in 2004.

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20 Media interview of Zhou Yanli, CIRC Vice Chairman, Xinhuane. 1 April 2008
Between 2003 and 2006, total premium revenues (including subsidies) in agricultural insurance doubled (see Figure 11), but distribution is highly uneven across the nation and is driven by the formation of specialised agricultural insurers with a local focus (see Figure 12). Five provinces – Xinjiang, Heilongjiang, Shanghai, Yuannan and Jilin – accounted for more than 80% of the market in 2006. By contrast, these provinces contributed just 11% of the total agricultural output in 2005, reflecting the low penetration of insurance in China’s agricultural sector.

Specialised agricultural insurers in China regard subsidised crop and livestock insurance as their core business. However, they are expected to be responsible for driving the development of all insurance in the rural sector, such as farm property, machinery, motor and even life and pension products for rural residents. Currently, non-agricultural insurance such as property, casualty or motor makes up a significant portion of the revenues for some agricultural insurers.
Predominantly multiple-peril crop and livestock insurance of questionable profitability

Yield-based multiple-peril crop insurance (MPCI) is the main form of agricultural insurance under the government premium subsidy programmes in China. MPCI provides a guarantee of an indemnity to the farmer when the actual realised crop yield is below an agreed predetermined level and is compensated at pre-agreed price levels. In China, the threshold is often set at the township’s average yield, while the sum insured represents 30 – 40% of production costs for most crops. In China, MPCI typically covers systemic perils, such as drought, flood, some pests, typhoon, frost and diseases, depending on the province.

Agricultural insurance products

Accounting for recent innovations, the following insurance products are generally available to the agricultural community:

1. Indemnity-based products, such as single-peril or multiple-peril crop insurance (MPCI), compensate individual farmers directly for their loss at the farm level. For livestock, this would be analogous to the mortality of insured animals. Area-based MPCI covers are based on district or country yields of a wider farming community. Revenue insurance is an extension of MPCI, where fluctuations of commodity prices are also insured to some extent. One disadvantage of indemnity-based products is that although they focus on individual farmers’ needs, they come with a high cost of loss assessment (adjustment) and administration. Moral hazard and antiselection are additional challenges of cover at farm level unless insurance is compulsory. In some countries, income protection insurance is also available to address the volatility of farmers’ earnings overall.

2. Weather insurance products are often modelled as an index of parameters measured at officially recognised weather stations (e.g. rainfall, temperature). The payout is often defined as a fixed amount, which is a function of the deviation of the actual weather parameter from the previously agreed one. It is well-known that the use of indices as benefit triggers, also called parametric products, introduce basis risks; however, such indices lead to savings in claims determination and to loss adjustments compared to indemnity-based products.

3. Price hedging products for traded agriculture commodities are vehicles that deal with fluctuations in output prices for a number of major crop types.

In many emerging markets, the key consideration for governments is whether subsidisation of a particular product addresses the needs of the target beneficiaries as well as the technical feasibility of the product. Indemnity-based insurance can still be regarded as the most comprehensive approach to addressing farmers’ needs. If designed and administered properly, they should still be the first option when governments are designing their agricultural insurance system.

Index-based products can complement a country’s agricultural risk management system if indemnity-based products are proven to be infeasible. In some countries, governments are willing to support and subsidise index-based products. For example, the Indian government is supporting the development of rainfall-indexed products. (see Focus: Weather insurance in India). In Mexico, Agroasemex, the government reinsurer, has implemented parametric solutions based on satellite measurements. Governments have begun to consider alternative solutions for risk management purposes.
Prior to the introduction of the national breeding sow insurance programme, livestock insurance was not very popular in China, apart from Shanghai, which has introduced compulsory epidemic disease insurance and government slaughter for commercial cattle, sow and poultry farms. With central government subsidies, breeding sow insurance emerged and covered an estimated 80% of swine in China in 2007. Under the livestock cover, insurers compensate farmers for mortality of animals due to diseases and accidents (fire, natural perils). Livestock insurance in China covers a wider range of events compared to international practise, where epidemic diseases are clearly defined and base mortality is separated from non-epidemic diseases and accidents. The government is expected to extend premium subsidies to cover dairy cattle in 2008.

According to the World Bank, only one agricultural insurer has consistently generated profit among the five insurance companies that were reviewed in 2007.21 Crop loss ratios (ie losses vs premium) were reported to be 70–90%. Livestock insurance performed better, with a loss ratio ranging from 54% to 60% in 2005, except in cases where epidemic diseases seem to have been insured. Expense ratios of agricultural insurance in China range from 15% to 30%. This resulted in combined ratios (ie losses and costs vs premium) in most cases that were 100% or above.

Governments are involved in reinsurance programmes
Another feature of China’s agricultural insurance market is that provincial governments generally act as the risk bearer of last resort as they are provided excess-of-loss cover for agricultural insurance through disaster relief payments or other mechanisms. One example is Beijing, where three insurers were authorised to underwrite a subsidised scheme. The Beijing government offers protection for losses above a 160% loss ratio to the insurers.

For agriculture, commercial reinsurance arrangements between insurers and international reinsurers are still not common, even though China’s agricultural sector is vulnerable to natural catastrophes. Insurers with a longer operating history and larger premium volumes and exposure could benefit from underwriting losses through their internal accumulated reserves or absorption by other lines of business. For example, it is reported that the agricultural risk fund of one insurer currently stands at over CNY 100 million.

Some agricultural insurers have purchased stop-loss treaties for their crop portfolios from international markets. In Zhejiang, an insurer led a government co-reinsurance programme for the province agricultural insurance pilot introduced in 2006. International reinsurers, together with the government, provided loss cover to agricultural insurers (see Glossary for the definition of stop-loss cover).

Risks for agricultural enterprises unaddressed
All of the attention so far has been focused on the weather risks that hit crops and livestock production at the farm level directly. However, the use of insurance to cover risks other than crop production and livestock mortality loss has not been common. Swiss Re and the Chinese Academy of Agricultural Science recently conducted a survey of sample agricultural enterprises whose operations span some segments of the value chain in five Chinese provinces to understand their demand for risk management, including insurance. An initial conclusion is that, apart from basic motor insurance and property insurance cover, agricultural enterprises have not used insurance to cover production shortfall and price risk. Many enterprises rely on their own funds to absorb non-production risk.

In China, the major risks faced along the agriculture value chains can be summarised as follows:

- **Production risk:** Processors are vulnerable to volatility in crop volume and commodity prices to cover their fixed costs (including amortisation of machinery and equipment, credit obligations, transport, labour) and deliver stable returns. Systemic perils such as droughts, floods or typhoons can create situations where crop production is reduced by 30% or more for a larger area, such as a province or a district. Additional costs can arise for processors who must then procure additional crops in the open market. The low quality of certain crops can have the same effect as volatility in production. For corporations that invest in agricultural production or run contract farming schemes with a financing component, increases in input prices (e.g. seeds, fertiliser or agriculture chemicals) can lower expected profits considerably. Similar to processors and at a lower level, farm input suppliers can face a drop in sales due to weather conditions at the planting stage or during the growing season.

- **Price risk:** Volatility of prices can occur for certain agricultural commodities, depending on the demand and supply at the national and international levels, following the commitment to production. Price volatility can have severe effects for processors and traders. Commodity crop prices in China are inevitably affected by international market prices. A high current price during the sowing season induces farmers to plant more of a particular crop, which often results in excess supply by harvesting time, which in turn drives down crop prices. Farmers will then cut down the production of that crop during the next season. A natural disaster during the harvest period will further reduce the crop yield and lead to shortages of inputs to the processing industries. If prices for certain crops are low during the growing stage, farmers often plant other crops that they believe will yield higher prices. In Heilongjiang, farmers have reduced their exposure to the price volatility of soybeans since 2004. It was reported that soybean prices once climbed from CNY 2,800 to CNY 4,500, but dropped suddenly to CNY 1,200 per tonne within a month in 2004. In 2006, the sown area for soybeans in Heilongjiang was cut by 25% a year, followed by another 12% reduction in 2007. The summer drought in 2006 added additional pressure to soybean supply, which was estimated to have dropped by 40%. However, in China, soybean meal is a major input in poultry feed. In early 2008, the price of soybean meal has risen much faster than that of poultry feed prices, which climbed 30%.

- **Institutional risk:** Changes in regulation to control pests and diseases or seed material as well as import quotas for certain crops may change the cost of production. Other risks might arise from restrictions in conservation practises or land usage as well as from changes in income or credit policy.

22 Various media interviews, “Economics in Half an Hour”, CCTV, 18 December 2007
23 ibid
Logistics risk: Increasing demand for good quality and fresh food requires timely delivery of agricultural products. Long distances, poor storage and cooling facilities can degrade quality. Food enterprises or other intermediaries operate on a national basis to obtain raw agricultural products across provinces, which further stimulates the demand for transportation and efficiency. Logistics risk cannot be underestimated in China. The country’s food logistics system is short of frozen capacity, preventing the long haul shipment of fresh food produce. A study estimates that fruits and vegetables with a total value of USD 8.9 billion, or 30% of total output, are lost annually due to the lack of proper frozen capacity. In the United States, the figure is less than 2%.  

Credit risk: Rural lending institutions, where farmers collateralise farm credits with future harvests, can face non-covered credits and are exposed to the farmer’s inability to repay the loans. Weather risks as well as pests and diseases can cause severe cash flow problems for farmers. As in many other countries, Chinese farmers mainly borrow from rural credit cooperatives to fund their concurrent input costs and investment (e.g. machinery) needs. The first priority to increase the farmers’ awareness of their responsibility as a borrower, given that they may not have faced tight credit requirements for a long time. This is due in part to the conventional practices of rural finance, as rural credit institutions did not put too much effort into credit control prior to rural finance reform starting in 2003.  

Food safety and product liability: Due to increasing awareness and environmental concerns, producers and processors face the risk of tightening international standards in food safety, including product recalls. A notable example is the use of malachite green, which can cause cancer. It is prohibited in many parts of the world, and China banned fish farmers and other businesses from using the chemical as a fungicide in 2002. As food safety becomes an increasing concern both domestically and internationally, it will increase the likelihood that agro-food businesses could be liable for the adverse consequences of their products.

Against this backdrop, all stakeholders along the agricultural value chain – i.e. farmers, rural lenders, input suppliers, food processing enterprises, distributors of agricultural products and local governments – could benefit from a solution to prevent, control and mitigate financial and non-financial loss from different risks. Currently, government efforts are focused on the development of basic protection at the farmer level. Risk awareness among food processing enterprises and other downstream players is low.

Issues to be addressed

This chapter has identified the features of China’s agricultural insurance system. Three outstanding issues deserve further investigation:

1. The recent growth of agricultural insurance in China was due largely to premium subsidisation schemes. The commercial prospects for agricultural insurance are still uncertain, perhaps due to an uncertain legislative framework. How can China develop a sustainable, commercially viable system in the longer term?
2. As agricultural insurance is going to expand to new provinces with new products to be included, the exposure to and potential for large losses by the insurance industry are likely to increase. Reliance on local governments as reinsurers of last resort could heighten their fiscal burden while suffocating private initiatives. How should agricultural reinsurance cover be promoted?
3. Most of the recent developments in the agricultural insurance focus primarily on crop and livestock production. How can China promote risk management among agricultural enterprises and other segments of the value chain?

With respect to the above questions, the next chapter will provide a brief overview of the practices in other countries.

25 This is expected to improve. In 2006, the State Council launched the reform of rural credit cooperatives on a national basis. By the end of 2007, the non-performing loan ratio had dropped to 9.3%, compared to 37% in 2002 according to a media release by People’s Bank of China on 6 March 2008
Experience of agriculture insurance in other countries

Based on the issues identified in the previous chapter, this section will provide an overview of the latest developments in agricultural insurance and risk management practices around the world. Readers who are interested in knowing more about the recent development of agricultural insurance markets may read *sigma* No. 1/2007, “Insurance in emerging markets: sound development: Greenfield for agricultural insurance” published by Swiss Re. This chapter will specifically refer to examples where Swiss Re has direct experience.

Enhancing system sustainability through public-private partnerships

Public-private partnerships (PPPs) have been increasingly promoted in the international community as the preferred approach for addressing agricultural risk at the farm level. If markets operate freely, PPPs will bring together the efficiency, flexibility and competence of the private sector and the accountability, long-term perspective and social interests of the public sector. In PPPs, government often limits its role as a regulator, instead of operator, and promotes participation through premium subsidies. In some markets, government also plays a key role in reviewing policy wording and rate calculations. In most countries, the private sector’s role is to run the subsidisation programme at its own expense. For insurance schemes without government subsidisation, private insurers simply operate on a commercial basis.

Another dimension of public-private partnership is the government’s provision of disaster relief, which will be discussed in the next section on reinsurance. Government can also assist in the development of an infrastructure that facilitates data collection, human resources development and improvements to industry practice.

Legislation

In agricultural insurance, the government defines the rules of the game through the proper legal and regulatory frameworks. Legislation is critical to justifying the use of public money for premium subsidies and for increasing participation by leveraging other regulatory requirements. One such example is Japan, where crop insurance schemes began when the Agricultural Insurance Law was enacted in 1929. The scheme was later reorganised in 1947 to increase premium subsidies from 15% to 50%. After village-level mutual associations were set up to pool agricultural risk, virtually all farmers were automatically covered by the scheme.

A more recent example is the United States, where the Crop Insurance Reform Act of 1994 increased the percentage of farmers with coverage from less than 45% to 80%. The Act required farmers to enrol in the insurance scheme in order to be eligible for other Federal farm income support. To boost enrolment, the Agricultural Risk Protection Act of 2000 was passed to increase the Federal Government’s premium subsidies, particularly for higher levels of coverage.

Government can get involved in subsidising bancassurance programmes where insurance protection is tied to a farm’s credit. For example, the Brazilian government subsidises agriculture insurance covers in Brazil including insurance to part of the loan portfolio of Banco do Brasil, the country’s largest bank and agricultural lender. It becomes an effective distribution platform because the bank requires an MPCI cover for the farm credits which were backed by future harvest collateral. In India, enrolment in the National Agricultural Insurance Scheme is compulsory for farmers who take out seasonal agricultural operation loans from financial institutions.

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28 Agricultural Insurance Company of India website (http://aicofindia.nic.in/19.html).
**Delivery and managing agencies**

Instead of direct provision of agricultural insurance by a government insurer, the private sector typically provides expertise in risk management and runs government subsidisation programmes. In almost all European countries, agricultural insurance is offered by commercial insurers or mutual insurance companies. Exceptions are Greece and Cyprus, where compulsory insurance is provided through government insurers. In the United States, the government has shifted its role from that of executor to a supervisory body. The Federal Crop Insurance Corporation (FCIC) was formed as a government insurer to offer multiple-peril crop insurance (MPCI) in 1938. In the first few decades of operation, the FCIC delivered the insurance through its own employees, but the participation rate was low. With the passage of the Crop Insurance Act of 1980, private insurers began to deliver the Federal MPCI programme with costs paid by government, at which point the United States shifted to a public-private partnership model. In the US, the government also assumes an active part in the review of insurance wordings, rate calculation and loss adjustment concepts and approaches.

In some countries, the management and development of agriculture insurance programmes is performed by managing agencies that acquire the business for insurance companies. In such a set-up, the insurers do not need to have experts on agriculture insurance. For specialised business such as aquaculture, forestry and bloodstock insurance, managing agencies are more popular as these lines of business require technical expertise and a global perspective, which local insurers may not have. Some examples of managing agents exist in Australia, South Africa, Brazil and US subsidised crop insurance.

**Infrastructure development**

Government and statutory bodies in some countries also provide support for the development of market infrastructure. Data provisional services, standardisation of contract wording, training and R&D are considered “public goods” and benefit the society at large. For example, the Risk Management Agency of the US Department of Agriculture financially sponsors educational programmes on agricultural risk management. It also collects and publishes crop loss and other market data to facilitate product and pricing development. In Spain, the Ministry of Agriculture, Fisheries and Food has an agency in charge of developing market expertise.

**Premium subsidies**

Due to the systemic nature of drought and the high costs of insurance, MPCI is seldom offered without government premium subsidies to make it affordable for farmers. Named peril cover (e.g., hail, fire, frost, storm) is offered without subsidies in many markets such as Europe, Canada, Australia, South Africa and Argentina. The earliest crop-hail programmes were set up by farmer cooperatives in France and Germany during the 1820s. Today, single-peril policies are still available commercially in all European countries while new MPCI programmes are increasingly implemented. However, providing comprehensive agricultural insurance solutions in emerging markets will be challenging without premium subsidies and a proper legislative framework, especially in the early stages of development.

Premium subsidies are considered vital to the prosperity of agricultural insurance. According to a European Commission study, the agricultural insurance systems of five countries (Austria, France, Italy, Luxembourg, Spain) are regarded as well-developed because most climate-related agricultural risks are covered by multiple-peril crop insurance. The premium subsidy levels of these countries vary from 2.4% in France to 67% in Italy. In Canada, the federal and provincial governments subsidise 60% of premiums. In India, the government subsidises weather index insurance (see box below).

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30 In the European context, MPCI does not cover plant diseases and plagues, unlike those in the United States.
Focus: Weather insurance in India

India’s agriculture insurance programmes date back 30 years. Operated by the Agricultural Insurance Company (AIC), the National Agricultural Insurance Scheme (NAIS) has been offering protection for commercial horticulture since 1999. This coverage is compulsory for farmers requiring loans from credit agencies; farmers pay a flat rate independent of the region and crop type. Although premium rates are subsidised, insurance penetration remains low. Only 7% of farmers are covered. Policymakers and the insurance community are exploring new solutions so that an efficient insurance distribution network and the administration of small-sized insurance contracts lead to improved insurance penetration.

Against this backdrop, index-based rainfall insurance is gaining interest in India. The policy pays out when the level of rainfall is below a critical level. The payout of weather insurance occurs as early as a few weeks after the harvest, which is in stark contrast to the much slower settlement process of the current NAIS crop insurance scheme. To overcome the basis risk, insurance policies can be written as yield index contracts, where indemnity is based on production shortfall.

Through AIC and private insurers, including ICICI Lombard and Iffco Tokio, weather indexed products are currently distributed to 5 million farmers. Swiss Re began reinsuring a scheme developed by ICICI Lombard together with microfinance provider BASIX in 2004, which targets smaller farmers. Since then, Swiss Re has written over 40 transactions reinsuring Indian insurers against weather risks related to farmers. The Indian government introduced a weather insurance scheme mainly for crops to insure against excessive deficit rainfall/temperature during the autumn harvest (Kharif) and sowing (Rabi).

For the 2007 budget year, the government allocated USD125 million to develop NAIS; an additional USD25 million was set aside for insurance companies to further develop weather index-based insurance schemes. It is intended to re-evaluate the current premium rates and strengthen the actuarial basis for the national crop programme.

Reinsurance arrangement

Natural catastrophes in agriculture could significantly impact the capital base of direct insurers. To deal with catastrophe risks, direct insurers reinsure themselves. International reinsurers have comparative advantages in providing risk capital or diversifying risks on a global basis. Reinsurers can choose to retain the catastrophe risk themselves, cede it to other partners within the insurance community or transfer it to the financial markets through securitisation or other modern financial innovations.

In regard to public-private partnerships, pool arrangements have been a common approach for dealing with large risks. Pools are often organised by governments for subsidisation programmes in cooperation with commercial insurers. Mandatory contributions from agricultural insurers (or a share of the direct insurance premiums) across regions over time will result in the accumulation of a pool of reserves to pay claims when major catastrophes occur. The pool can also be leveraged by purchasing additional coverage from global reinsurers or making use of international capital markets. Financial market instruments are also increasingly used to transfer catastrophe risks.

31 For more details, please refer to Roman Hohl and Harini Kannan, “Greenfield for Agriculture Insurance”, IRDA Journal, December 2007
3 Experience of agriculture insurance in other countries

Table 3
Reinsurance arrangements of selected public-private partnerships

<table>
<thead>
<tr>
<th>Country</th>
<th>Scheme</th>
<th>Insured party</th>
<th>Mandatory</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Standard Reinsurance Agreements</td>
<td>Commercial insurers who run subsidised schemes</td>
<td>No</td>
<td>Government subsidises premiums for MPCI and costs to operate the programmes. Insurers choose the level of contribution to funds. International reinsurers provide reinsurance cover.</td>
</tr>
<tr>
<td>Spain</td>
<td>Consortium for Insurance Compensation (CCS)</td>
<td>Commercial insurers who run subsidised schemes</td>
<td>Yes</td>
<td>CCS retrocedes a significant portion to the international reinsurance market.</td>
</tr>
<tr>
<td>Mexico</td>
<td>Reinsurance schemes with Agroasemex and other reinsurers (new)</td>
<td>Mutuals (Fondos)</td>
<td>Yes</td>
<td>The law requires Fondos to provide 100% liabilities guarantee, so reinsurance is implicitly required. Agroasemex also retrocedes through financial market innovations.</td>
</tr>
<tr>
<td>Turkey</td>
<td>TARSIM, an insurance pool</td>
<td>Shareholders of TARSIM</td>
<td>Yes</td>
<td>TARSIM is owned by a panel of insurers and provides government-sponsored stop-loss arrangements.</td>
</tr>
</tbody>
</table>

Source: Swiss Re Economic Research & Consulting

The table above summarises the reinsurance arrangements of some countries. In the United States, for example, direct insurers obtain reinsurance cover for loss ratios above 500% per state from the Risk Management Agency of the US Department of Agriculture through its Standard Reinsurance Agreements. Insurers choose the level of contribution to different risk funds that in turn provide reinsurance cover. In Spain, commercial insurers of the Consortium for Insurance Compensation (CCS) set up a pool to co-insure themselves against systemic risk. CCS also retrocedes a significant portion to the international reinsurance market. In Turkey, insurers participate as shareholders of TARSIM, which provides government-sponsored stop-loss arrangements. In Mexico, mutual organisations (Fondos) are required to establish reinsurance cover through Agroasemex, an organisation owned by the Mexican federal government. Some Fondos also retrocede to international financial markets to protect their risk portfolio.
Public-private partnerships (PPPs): The case of Spain

Spain has operated its agricultural insurance system through PPPs since the passage of the Agricultural Insurance Act in 1978. The system consists of three main parties: (1) the Spain Agricultural Insurance Agency (ENESA), which coordinates and executes the subsidised insurance plan, (2) Agroseguro, a coinsurance pool of private insurance companies that offers the first layer of underwriting, and (3) the Consortium for Insurance Compensation (CCS), which offers reinsurance purchased by Agroseguro on a compulsory basis. CCS also retrocedes a significant part of its exposure to the international reinsurance market. Agroseguro itself can also purchase additional reinsurance cover. Swiss Re reinsures CCS.

The Spanish system, which has been successful for 30 years, is a prominent example for other countries that are interested in having the private sector run government-supported agricultural insurance programmes. Premiums are subsidised by the Spanish and regional governments, and range from 20% to 45%. It is a comprehensive system that offers a broad range of covers. Agricultural insurance in Spain, which currently covers 30% to 40% of all outputs with more than 200 insurance policies for many different crops and animals, is financially sustainable. The average loss ratios from 1980 to 2004 for all policies, experimental policies and viable policies were 99.56%, 114.31% and 82.98%, respectively.

Risk management of the agricultural-food value chain

Modern agriculture has changed from commodity agriculture to product agriculture, which is driven by end-user demands as opposed to bulk undifferentiated outputs. Vertically-integrated agribusiness firms are increasingly organising the supply chain from the seed to the supermarket. New technologies, such as information technology and modern processing equipment, enable agribusiness firms to exercise greater control over each phase of the food production process. Value chains, in contrast to supply chains, are consumer driven and more closely integrate production, processing, marketing, and distribution.

Contract farming and other alliance arrangements are increasingly used. Through vertical integration and alliance building, agribusiness has enhanced its ability to manage quality and volatility in quantity supplied and price. Demand for high quality assurance in modern agriculture is also reflected in the adoption of the Identity Preserved (IP) system, which involves maintaining the unique traits or quality characteristics of a crop – from the seed stage to its subsequent transportation, handling and processing. In the United States, for example, contractual arrangements accounted for about 35% of the total value of US agricultural production in 1998. Meanwhile, in addition to production risk, agricultural corporations face credit, product safety, logistics, business interruption and market risks. To ensure seamless operation of the whole chain with minimal disruption, enterprises demand solutions that cover all types of unexpected events. Instead of dealing with these risks on an individual basis, agricultural enterprises can use an integrated approach to manage a portfolio of risks.

32 For more description about the Spanish model, see Swiss Re sigma No. 1/2007
The concept of integrated risk management has been well-known in non-agricultural business. Conventionally, unexpected weather developments and the volatility of commodity prices are two major sources of uncertainty in farming and the value chain. In many markets, agricultural firms have recognised the benefits of managing their exposure using a single unified framework. For example, a Canadian grain producer has adopted an integrated risk management programme to identify the risks faced in all functions of the enterprise and purchased insurance coverage at the group level (see box below). Although the adoption of such a holistic approach to managing risks in the value chain is still at an early stage – even in industrialised countries – the global agricultural market is no longer run by a group of loosely managed farmers. It has evolved into linked networks of agribusiness firms and actors that manage each phase, from production to consumption.

Government can promote agricultural risk management. For example, the Canadian Agricultural Policy Framework – a five-year initiative (2003–2008) – was designed to enhance the international competitiveness of the agricultural sector, food safety and quality, and business risk management. A Private Sector Risk Management Partnerships programme has been set up to enhance the capacity of the agricultural industry to manage risks that have not been covered in the past by public sector programmes. It also aims to increase the participation of the private sector financial services industry in providing risk management solutions (ie products and services) to the agricultural industry, by funding projects such as producer liability insurance and price risk assessment.

Integrated Risk Management in agriculture

Founded in 1906, Canada’s United Grain Growers (UGG, now named Viterra after the merger with Saskatchewan Wheat Pool) is a farmer-owned cooperative. UGG supplies grain, oilseeds and livestock products worldwide. Its stock began trading on the Toronto Stock Exchange in 1993. Both UGG and Saskatchewan Wheat Pool had their integrated risk management system in place before the merger, which can offer useful insights for the emerging Chinese agricultural enterprises operating on a large scale (at the national or provincial level).

Saskatchewan Wheat Pool (SWP)

SWP sourced different types of grain from three Canadian provinces with stable market shares. In drought years, below average production levels yielded low earnings. Therefore, SWP purchased a production shortfall cover against the situations where weighted production fell below a pre-agreed level. SWP’s market share was compared to the markets production levels. Each tonne of shortage below an 80% level of the expected production was compensated at an agreed value. If planted area fell below 95% of the historical level, eg due to changes in the growing areas, the shortfall trigger was adjusted accordingly.

United Grain Growers (UGG)

Similar to SWP, UGG operated in an uncertain natural and market environment. As the first step, UGG established a risk management committee internally and appointed an insurance consulting company to identify all risk exposures facing the corporation. The impact of these identified risks was then quantified in financial terms, such as earnings before interest and taxes. Weather risk was found to be poorly managed and had an adverse impact on UGG’s profit. UGG eventually developed a total solution to manage these risks and entered into an integrated policy contract with Swiss Re that provided not only grain volume protection, but also property and liability coverage for the whole group.
4 Strategic directions

This report has reviewed the current status of China’s agricultural sector and recent developments in agricultural insurance. It has also provided an overview of the relevant experiences in other countries. Additionally, certain challenges and the risk landscape of companies in the agricultural value chain have been analysed.

Based on Swiss Re’s knowledge of the global development of agricultural insurance, together with its understanding of China’s “Guo Qing” (ie specific conditions of China at this stage of development), this report concludes with a number of strategic observations that policymakers, the insurance community and key stakeholders in the agricultural sector could build on for the future.

Cultivating a sustainable practice based on commercial principle

1. Subsidies: In China, premium subsidisation programmes have been proven to be effective in promoting agricultural insurance. They can be expanded in scale and scope at the initial stage of market development to include additional provinces and new crops and livestock (eg high value crops, aquaculture, forestry). If affordable and viable, products with catastrophe covers, which may incur higher deductibles, should be encouraged. Fiscal financial support can be used to leverage private sector resources and reduce the burden of disaster relief. Recent innovations such as index products and farm income insurance can also be considered.

2. Legal framework: Legislation can help facilitate market development by reducing the uncertainty of the business environment. For instance, insurers may be reluctant to extend cover for livestock epidemic diseases as the government slaughter orders regarding epidemic disease outbreaks are not clearly defined. By defining clear rules and guidelines, provincial governments, commercial insurers and the insured can adopt a set of nationally applicable operational guidelines, while developing a local model within the legal framework. Agricultural insurance should be regulated only if it involves direct premium subsidies. Otherwise, it can be supervised under the current Insurance Law and related regulations.

3. Infrastructure and research & development: For sustainability, infrastructure development and industry standards are also important. Government can invest in collecting and publishing data with sufficient precision so that the industry will be able to develop and actuarially price agricultural insurance products to reflect regional exposure. Agricultural officials should systematically identify key perils for key crops or livestock and create a national database with information on planted areas. The Ministry of Agriculture, farmers’ organisations, academia and meteorological agencies can facilitate development by conducting collaborative research with insurers (eg risk modelling and yield forecasts). Universities and other educational institutions can organise training programmes for agricultural loss assessors and other risk management professionals in this field. Centres of excellence can be created to promote expertise development.

4. Delivery and management agencies: In addition to financial incentives, enrolment in agricultural insurance can be encouraged through the use of bancassurance. By tying insurance protection to agricultural loans, the creditor’s interests can be protected. With risk protection, financial institutions will be more willing to extend credit. This is essentially a way to treat insurance policies as a form of collateral, thereby increasing the value of risk protection to the whole system.
Utilising reinsurance and capital market solutions
5. Reinsurance can assist the development of agricultural insurance in several ways. Government or the insurance industry can continue to promote the use of provincial-based reinsurance or co-insurance arrangements, as this is the most direct way to address local exposure. Establishing a national reinsurance pool to handle extreme losses can be a longer term solution. Initial financial support from the governments will offer incentives to encourage such development. Ultimately, fiscal burden in terms of direct disaster relief can be reduced. Privatisation of the pool by inviting domestic and international insurers/reinsurers to take ownership is also an option.

6. International reinsurers should be encouraged to participate in the organised reinsurance programmes due to their expertise and reinsurance capacity, similar to Spain’s model. International capital markets could ultimately be utilised. This will increase the overall capacity of the pool. The impact of the global reinsurance cycle can be addressed by multi-year contracts. Excess volatility of the international market would be partly isolated. Government can still be the risk bearer of last resort and offer liquidity support in case of severe catastrophes.

Encouraging integrated risk management in agriculture
7. The government can play an integral role in promoting risk awareness in various sectors along the agriculture value chain, including production shortfall, price volatility, transport risks, food safety exposure and various business interruption aspects. Index products, weather derivatives and business interruption insurance should be actively promoted and used for specific situations. The insurance community can leverage its expertise and experience to provide tailored solutions to the stakeholders along the agricultural value chain.

8. For “Dragon’s Head” enterprises, tax incentives or other financial support can be used to encourage risk management practices, including appropriate insurance cover and internal risk management procedures. Through further development of contract farming, processors can stabilise the annual production needed for processing. With insurance against production shortfall, earnings can be stabilised in case of severe drops in raw material supplies.

9. By supporting the development of commodity exchange and including more agricultural commodities for trading in the exchange, the government can provide more options for the farmers and the agricultural companies to manage price risk.
Concluding remarks

China began 2008 with a once-in-a-100-year snowstorm. According to CIRC, the insurance industry had already processed 947,000 claims by the end of February. Yet, the total value of claims, estimated at CNY 1.6 billion, represented just 1% of direct economic loss – valued at CNY 111 billion by the government. Moreover, crop and livestock insurance contributed just CNY 58 million to the entire bill. Even in “normal” years, weather risks cost China CNY 100 to 180 billion. Therefore, a protection gap exists in the agricultural economy.

China must address this challenge as well as others it faces in regard to global trends in agriculture, such as an increasing demand for agricultural raw materials, limited arable land and the potential impact of climate change. Additionally, the agricultural sector is undergoing continued consolidation, and vertical integration as well as further trade liberalization are putting more pressure on producers at various levels. Moreover, the biofuel industry is competing with the food sector for the same crops.

As is the case in other locations, China also seeks to ensure its ability to guarantee sufficient food supplies for its 1.3 billion people, maintain stability in rural income, deal with the volatility of commodity prices and successfully navigate through the trade politics of the global community. Through this report, Swiss Re intends to offer our contribution from an insurance and risk management perspective.

In the world of agricultural insurance, no country can regard its practices as best in class. No single model can be introduced in China without considering the country’s provincial diversity and political realities. Only through honest and serious dialogue with the international insurance community can China develop its own recipe.
Annex: China’s agricultural sector – facts and figures

**Agricultural sector**

**Macroeconomic indicators, 2007**
- Agricultural GDP: CNY 2,891 billion (USD 380 billion)
- 11.4% of total GDP
- Number of agricultural workers/farmers: 348.7 million
- Disposable income of rural population: CNY 4,140 (urban: CNY 13,786)

**Sub sector contribution, 2006**
- Crop 56.4%
- Forestry 4.4%
- Livestock 26.6%
- Fisheries 10.3%
- Agricultural services 2.3%

**Major outputs, million tonnes, 2007 (change from 2006)**
- Grain: 501 (+0.7%)
- Cotton: 7.6 (+1.3%)
- Oilseed: 24.6 (−4.2%)
- Sugar: 111 (+11.4%)
- Meat: 68 (−3.5%); pork (−9.2%)
- Aquatic: 4.74 (+3.3%)
- Wood: 6.98 (+5.5%)

**Resources**
- Arable land: 123.73 million hectare

**Ministry responsible**
- Ministry of Agriculture

**Latest government documents**
- State Council (2008/No. 1), “Opinions of Promoting Infrastructure for the Development of Agricultural Industry and Intakes of Rural People”

**Agricultural insurance**

**Regulatory body**
- China Insurance Regulatory Commission (CIRC)

**Major regulations**
- Insurance Law
- Regulation Governing Agricultural Insurance (expected in 2008)

**Total agricultural premiums**
- 2006: CNY 0.9 billion (USD 102 million)
- 2007: CNY 5.3 billion (USD 700 million)

**Major players**
- Specialised agricultural insurers, a few non-life insurers, domestic and foreign reinsurers and brokers


**Adverse selection**
The tendency of high-risk farmers to buy and maintain insurance or the tendency for farmers to apply for insurance only for high-risk crops or plots.

**Agriculture insurance**
Provides cover for crops, livestock, aquaculture, forestry and greenhouses.

**Area-yield approach**
Indemnity is based on the shortfall or average yield of a defined area compared to a pre-determined normal yield of this area, regardless of actual shortfall of sub-units within this area.

**Assessor/Adjustor**
A person appointed to assess and settle any claim made on an insurance policy.

**Basis risk**
Mismatch between insurance payout and actual insurance loss that normally occurs in index-based insurance products.

**Dragon’s Head enterprise**
In China’s agriculture, Dragon’s Head enterprise refers to agribusiness that has officially received special attention and fiscal support from various levels of government. These enterprises were deemed to be able to drive the economic development of the rural community. As of April 2008, more than 580 national-level Dragon’s Head enterprises have been identified by the central government.

**Households Production Responsibility System**
It was the first market-based reform in China’s agriculture. In the late 1970s, a group of farmers and local officials in Anhui proposed a system where the government procured agricultural outputs from farms and farmers then sold excess outputs in the free markets after they had fulfilled the contractual obligations. This initiative was accepted by the central government as the blueprint to reform the agricultural production of the whole nation. This reform motivated Chinese farmers to maximise the efficiency of land use, which had been suppressed during the period of orthodox communism.

**Index insurance**
Compensation of index insurance is based not on actual monetary loss incurred by the insured, but a pre-determined, critical level of external data that triggers the payment. Rainfall and temperature are often used as triggers.

**Moral hazard**
Induced by being insured, the insured tends to become careless. Other improper behaviours include fraudulent claims and a lack of responsibility for farmland.

**Multiple-peril crop insurance (MPCI)**
A type of yield-based crop insurance in which more than one peril is covered. Indemnity is assessed based on the difference between expected and actual yields.

**No. 1 Document**
This political jargon refers to the first document issued at China’s State Council (sometimes having Chinese Communist Party as a prefix). It is often interpreted by experts that the content of this document reflects a conclusive policy agenda at the level of central government. In recent years, rural development has appeared repeatedly in the No. 1 Document.

**Peril**
A potential cause of loss or damage to the property or the insured object. In agriculture, common perils are drought, hail, frost, flood and typhoon.
Reinsurance
Insurance covers brought (or ceded) by primary insurers. It helps to reduce the capital reserve required of primary insurers, due to the ability of reinsurers to diversify globally.

Revenue insurance
Insurance policy that protects revenue shortfall of growers. Uncertainties of both yield and price are addressed. Examples are Crop Revenue Coverage (CRC), Income Protection (IP) and Revenue Assurance (RA) schemes in the United States.

San Nong
“San Nong” is a Chinese acronym that refers to socio-economic issues with respect to three aspects of the rural sector: agricultural industry, villages and farmers. The concept was proposed by an economic professor in China in 1996. The Chinese governments included this word in various official documents in 2001 and listed it as a policy agenda item in the annual Government Working Report in 2003.

Stop-loss cover
Also called excess of loss, it refers to (re)insurance policies that cover claims once they have exceeded a certain amount or the retention level.

Single-peril crop insurance
Also called named-peril crop insurance, it refers to an insurance policy that covers yield loss triggered by the occurrence of a defined weather event/peril.

Weather derivatives
A financial instrument that promises payment to the holder depending on the difference between an underlying weather index (e.g., accumulated snowfall) and an agreed strike value. Weather derivatives exist as futures and options and are traded on the Chicago Mercantile Exchange.