



**Actuaries
Institute**

Insights - Agricultural Insurance in China

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Introduction of China's Agriculture Ins Market

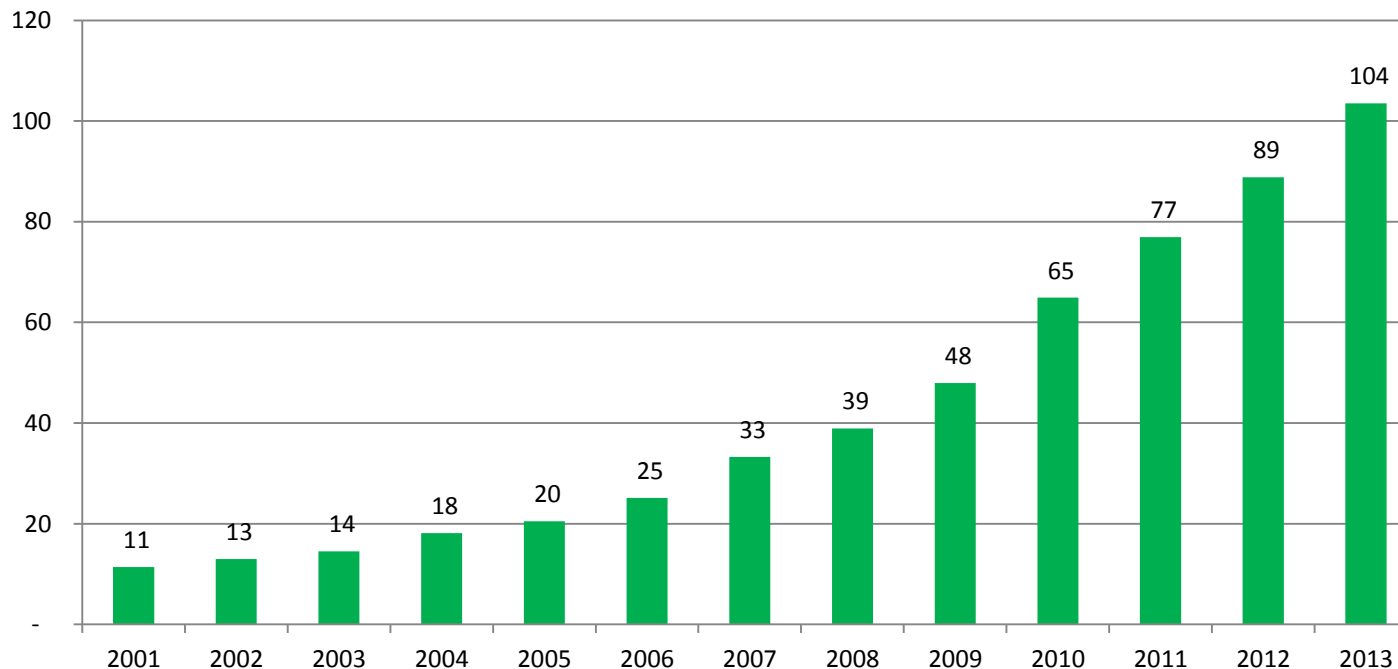
Agricultural Insurance Products in China

Actuarial Aspects of Agricultural Ins

Agricultural Reinsurance Market

- ☉ China's P&C insurance market was growing rapidly during the past decade, with an average annual growth rate of 22%.

**P&C Insurance Premium in China
(in billions of dollars)**

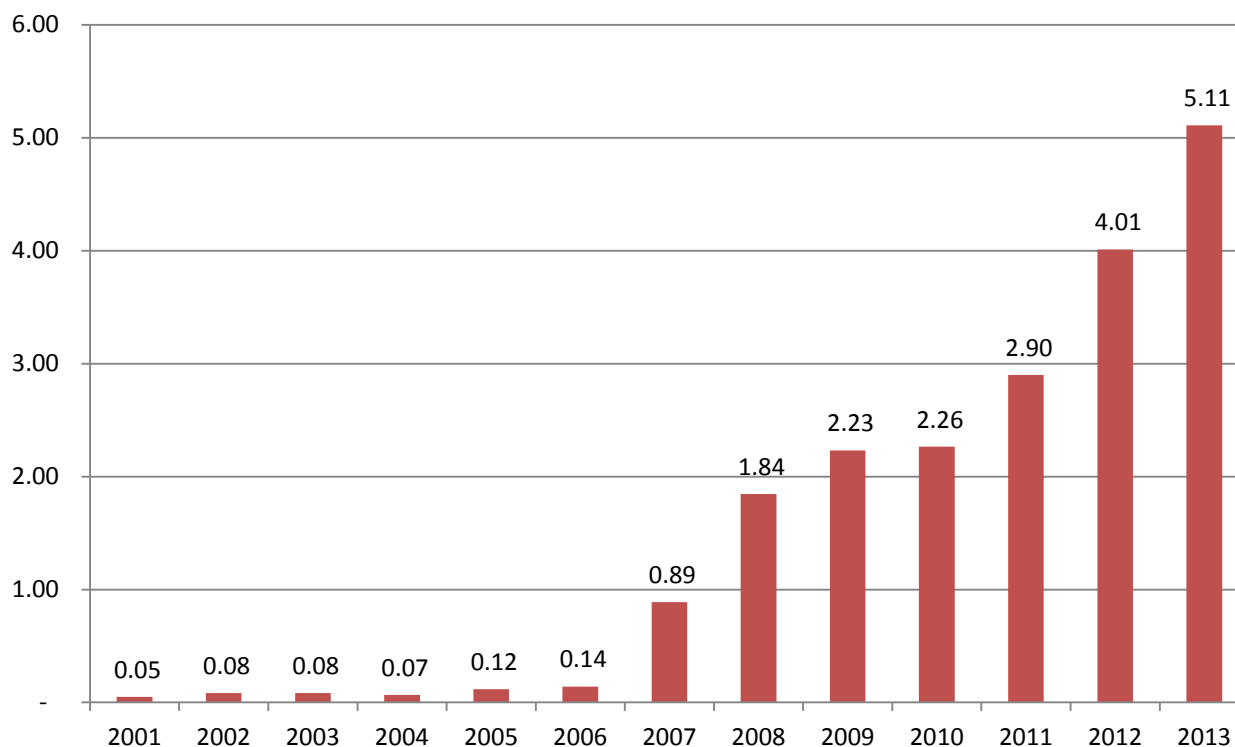


Source: China Insurance Regulatory Commission

Premium Growth of Agro Ins

- ☉ The premium volume of agricultural insurance in China has grown rapidly since 2007, driven by government subsidies.

GWP of Agro Ins (USD,billion)

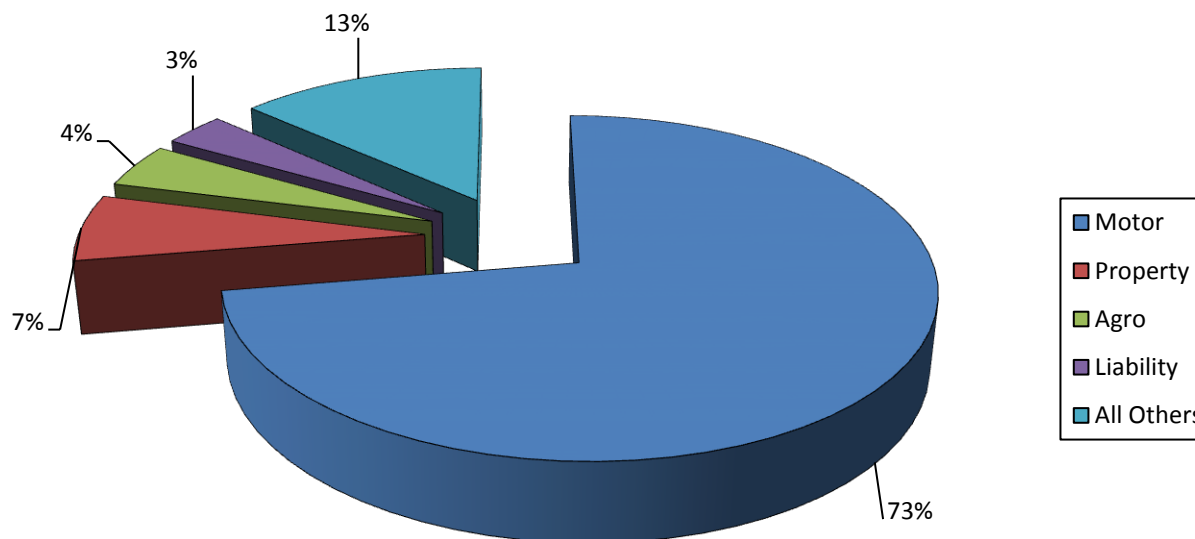


Source: National Bureau of Statistics of China

Status of Agro Ins in China

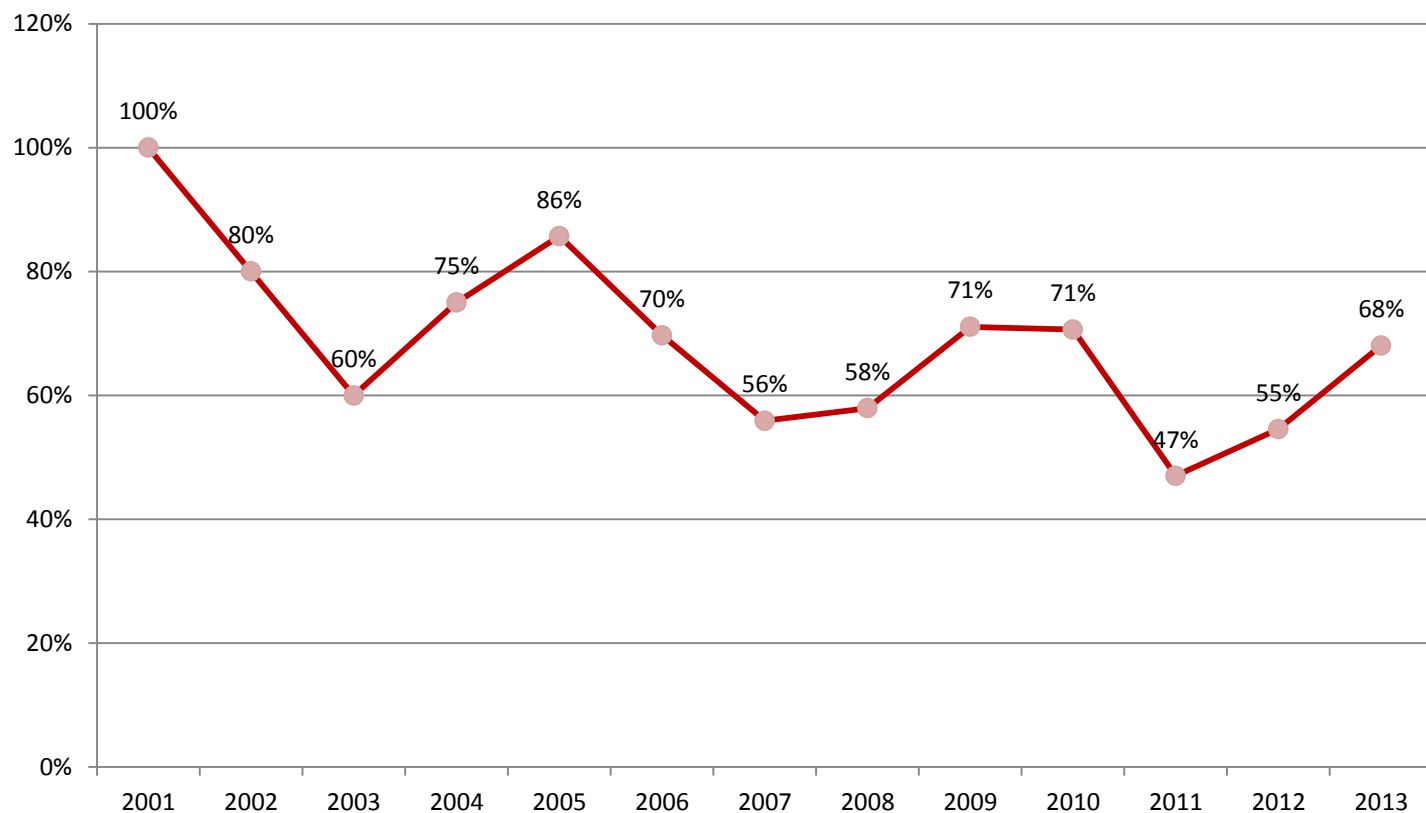
- ☉ The agricultural line has become the 3rd largest line in China's market, exceeding the liability line, since 2008.
- ☉ China has become the 2nd largest agricultural insurance market in the world since then.

Composition of P&C Premium in China



- ☉ The loss ratio of agricultural insurance in China fluctuated wildly during the past decade.

Loss Ratio of Agricultural Insurance



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- ☞ Most of the agricultural insurance products are traditional products.

Classification



Damage-based ✓

Yield-based ✓

Revenue-based ✗

Classification



Named peril ✓

MPCl ✓

All risks ✗

- ⊗ Agricultural insurance in China has just developed rapidly during the past several years, and there are still some issues that need to be resolved in the future.

Sum Insured is based on materialized costs of production, excluding labor costs.

Sum Insured is only a proportion of materialized costs.

Revenue-based products need to be considered.

Some clauses need more communications, e.g. franchise.

- ☉ One of the specialized agricultural insurers in China started to promote the weather index-based insurance(WII) in August 2009.
- ☉ By now, there are several insurers who have tried the WII but met some problems such as pricing risk and basis risk.

Rice Weather Index-based Insurance

- (1) During the period from 15 May to 31 August, if the cumulative precipitation(CP) is less than 230mm, then the amount of compensation per acre= $\min[\text{RMB } 150, (230-\text{CP}) \times 1.2]$
- (2) During the period from 1 September to 15 October, if the cumulative precipitation(CP) is less than 15mm, then the amount of compensation per acre= $\min[\text{RMB } 100, (15-\text{CP}) \times 6.7]$
- (3) During the period from 30 July to 15 August, if the cumulative temperature difference(TD) is more than 8 degrees Celsius, then the amount of compensation per acre= $\min[\text{RMB}240, (\text{TD}-8) \times 20]$

- ☞ In May 2013, pig price index insurance was promoted by one of the specialized agricultural insurers in China.
- ☞ There is still no Group Risk Plan (GRP) in China.

Pig Price Index Insurance

- The Sum Insured per pig is RMB 1200.
- The trigger index is the ratio of pig price to corn price. The basic value of the trigger index is set at 6:1 currently.
- At the end of the insurance period, if the average value of the index during the insurance period is R:1 and R is less than 6, then the amount of compensation per pig= RMB $1200 * (6 - R) / 6$.

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- ☯ “Agricultural Insurance Ordinance” was issued by the State Council of China in December 2012, taking effect from 1 March 2013.
- ☯ The Ordinance stipulates that
 - The premium rates of agricultural insurance products should be set by insurers fairly and reasonably.
 - For the government-subsidized agricultural insurance products, insurers should set the premium rates based on the opinion of the local governments and the representatives of farmers.
- ☯ There are some actuarial methods and results about agricultural insurance, but implementation needs to take into account more factors.

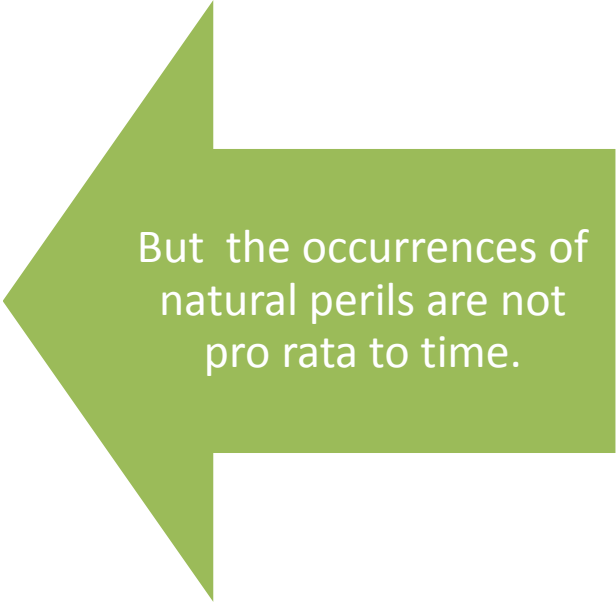
- ☉ “Administrative Measures for Catastrophe Risk Reserves of Agricultural Insurance” was issued by the Ministry of Finance of China in December 2013, taking effect from 1 January 2014.

If the insurer achieves underwriting profits in agricultural insurance and the profit margin is higher than that of the P&C industry for three consecutive years, then the premium rates of the insurance products whose profits are positive should be lowered appropriately in principle.

- ☯ The valuation of unexpired premium reserves (UPR) for agricultural insurance needs more improvements, but many realistic problems exist.



Many insurers still use the pro rata method.



But the occurrences of natural perils are not pro rata to time.



- ⊗ Besides the occurrence of natural perils, it makes the problem more complicated that the risk exposures of agricultural insurance are changing during the insurance period.

Growing Period of Wheat	Maximum Indemnity Limit
Seedling Establishment Stage	40% of Sum Insured
Heading Stage	60% of Sum Insured
Pustulation Stage	80% of Sum Insured
Mature Stage	100% of Sum Insured

- ⊗ It is like engineering insurance for whose UPR some insurers use the “squared method” rather than the simple “pro rata method”.
 - However, agricultural insurance is different from engineering ins.

- ☯ The insurers in China could set up the catastrophe risk reserve for agricultural insurance since 2008.
 - Agro Cat Reserve= Written Premium*25% before 2013.
 - More complicated after 2013, by line, by province.
- ☯ It is recognized by the State Administration of Taxation of China for the tax purpose, but not admitted by China GAAP and China Solvency Regulatory Accounting (like US SAP).

Agro Cat Reserve



<input type="checkbox"/>	China GAAP	×
<input type="checkbox"/>	China Regulatory Acctg	×
<input type="checkbox"/>	Taxation	√

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Agricultural Reinsurance Market

- ☯ Most reinsurance treaties in the agricultural market are stop loss(SL) treaties, and just a few quota share treaties exist for the solvency purpose.

- ☯ The No-Claims Bonus(NCB) clause is adopted in some SL treaties.

- ☯ Almost all the SL treaties use “GNPI Buffer”.
 - The GNPI is RMB 100M.
 - The structure: “40% of GNPI or RMB 48M whichever is the lesser
EXCESS OF 80% of GNPI or RMB 64M whichever is the greater”

- ☉ Most of the stop loss treaties provide coverage by province, rather than nationwide.
 - The reason is that the level of premium subsidies is dominated in the province level.
- ☉ Recently, however, the nationwide Umbrella Cover is becoming more popular, probably due to the new regulation on Agricultural Catastrophe Risk Reserves.

Umbrella 40% xs 90%
(UNL/FGU)

Province 1:
20% xs 100%

Province 2:
20% xs 100%



- ☯ Each reinsurance contracts in China must pass the significant risk transfer test, required by the regulator.
- ☯ The steps of significant risk transfer testing in China

1. Whether the insurance risk is transferred.

2. Whether the contract has the commercial substance.

3. Whether the insurance risk being transferred is significant.



☯ How to measure the degree of significance of the insurance risk being transferred?

- Calculate the insurance risk ratio for the contract

$$\text{Insurance Risk Ratio} = \frac{\text{PV of Deficit} * \text{Prob of Deficit}}{\text{PV of Reins Premium}}$$

☯ The contract will be recognized as a reinsurance contract when the ratio is greater than 1%, which is much like the ERD rule.

- Otherwise, financial instrument accounting will be applied.

☯ The “self-evident” rules are used for common proportional reinsurance and XL reinsurance treaties.

☉ A simple illustration of Significant Risk Transfer Testing

- For a crop QS reinsurance treaty, the treaty premium is CNY 1 billion
- The treaty has a sliding scale commission as below.

Loss Ratio	Commission rate
0%-60%	40%
60%-80%	30%
80% or above	20%

- The loss distribution of the treaty is as below.

Aggregate Loss	Probability
500M	70%
700M	20%
950M	10%



☉ Calculation of the ERD for the crop QS treaty

- The scenarios are as below.

Treaty Loss	Commission	Treaty Deficit	Probability
500M	400M	-	70%
700M	300M	-	20%
950M	200M	150M	10%

- Ignoring the discounting of the time value, the Insurance Risk Ratio is equal to $150M * 10% / 1B = 1.5% > 1%$.
- Therefore the contract will be recognized as a reinsurance contract.

- ☉ There are several key factors that will impact the future of the agricultural reinsurance in China.



1st Generation Solvency Regime

- Required Solvency Margin = $\max(18\% * \text{NWP within RMB 100M} + 16\% * \text{NWP in excess of RMB 100M}, 26\% * \text{Avg NIC within RMB 70M} + 23\% * \text{Avg NIC in excess of RMB 70M})$

2nd Generation Solvency Regime: C-ROSS

- China's Risk Oriented Solvency System (C-ROSS)
- $MC = \sqrt{\sum Corr_{ij} * MR_i * MR_j}$
- i, j denote the insurance risk, market risk and credit risk.

Old Administration

- Cat risk reserves for government subsidized **crop insurance** should not exceed the 25% of the government subsidized crop premium income.

New Administration

- An insurer will stop increasing the Cat risk reserves for government subsidized **agricultural insurance** when the balance amount of Cat risk reserves reaches the net retained crop premium of the insurer.

Questions & Answer

Many Minds are better than Only One.



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Thank You for Your Participation!

INTRODUCTIONS OF THE SPEAKER



Mr. Xiaoxuan(Sherwin) Li, has nine years of experience in the insurance industry and is currently the Head of Actuarial Department in China Re P&C. Before being transferred to the Actuarial Department, he worked in Treaty Reinsurance Department and Facultative Department for several years within China Re P&C.

He holds the Fellow of Casualty Actuarial Society(FCAS), the Fellow of the Institute and Faculty of Actuaries(FIA) and the Fellow of China Association of Actuaries(FCAA). He is also an Associate of Reinsurance Administration(ARA) and a Microsoft Certified Systems Engineer(MCSE). He graduated with a Master's degree of Actuarial Science from Nankai University in Tianjin, China.

