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Chinese Reinsurance Market: The Latest Development of Technical Aspects

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- China Re P&C released the first set of property exposure curves in September 2013, based on the insurance data it collected from the industry.

  - China Re Exposure Curves were composed of four curves, according to four categories of property risks that are commonly used in Chinese property insurance industry. The four categories of property risks are high-risk industrial, low-risk industrial, storage and common commercial.

  - The 2013 version of China Re Exposure Curves were mainly constructed on the insurance data of the industry before June 2013.


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守信用 担风险
重服务 合规范
基于近50万条企财险逐单数据的研究成果
中再产险发布国内首条风险曲线

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The Recent Large Claims in Chinese Market

- During the period from July 2013 to August 2015, several extremely large individual losses occurred in Chinese property insurance market, setting up new records of the largest individual insurance claim continually.

Cotton Warehouse Fire

- On 1st July 2013, a cotton warehouse in Shanxi Province got on fire, and the insurance claim was settled at around CNY 450 million.

Hynix Fire

- On 4th Sep 2013, a fire broke out in a factory of Hynix Semiconductor Company in Jiangsu Province, which resulted in an insurance claim payment of around CNY 5.6 billion.

Tianjin Explosion

- On 12th Aug 2015, an explosion occurred in a warehouse in the port of Tianjin. The final amount of insurance loss might exceed Hynix.

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Trend of Claims Frequency in the Market

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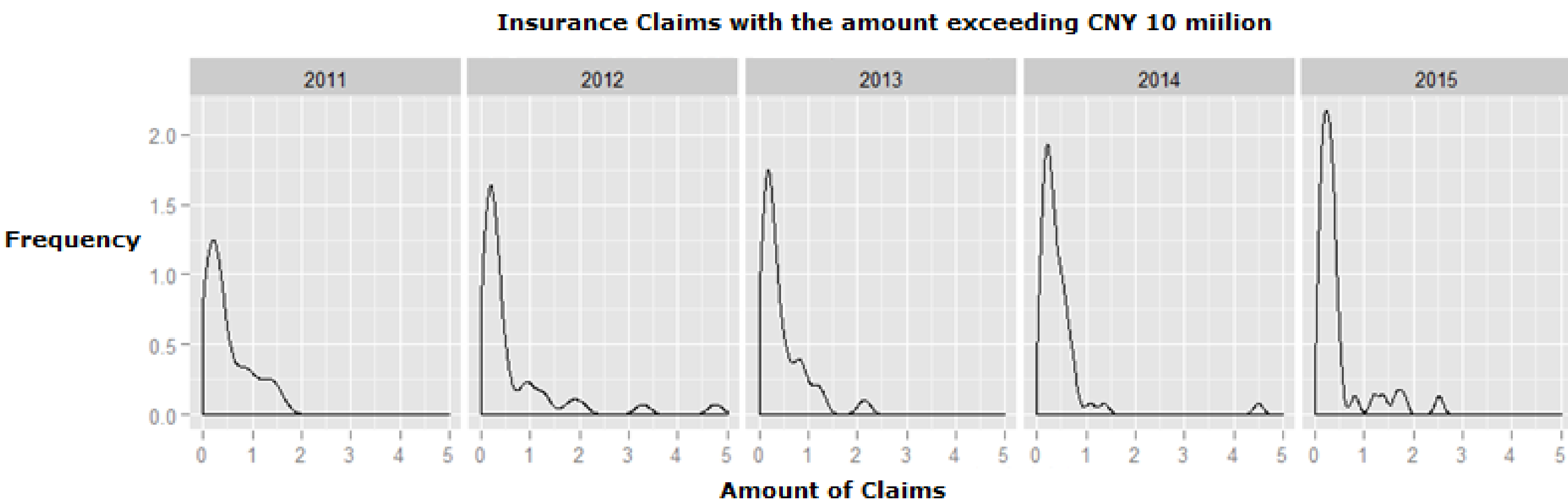
- All the insurance claims whose amount were more than CNY 10 million were reviewed, and it could be witnessed that there was an obvious increasing trend in the frequency of the claims during the past five years.



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Trend of Claims Severity in the Market

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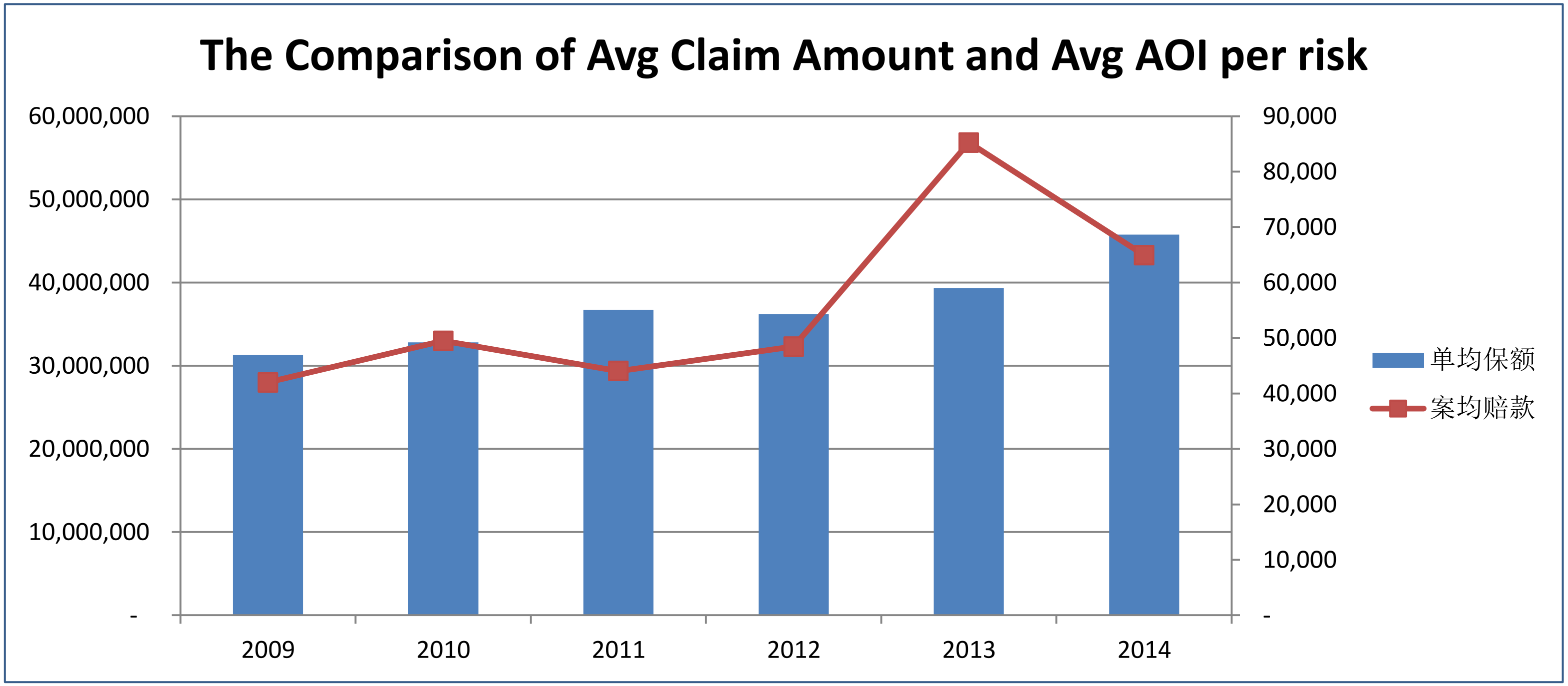
- Both the average AOI per risk and the average amount per claim were analysed during the past several years.
  - The average AOI per risk was increasing gradually during these years.
  - The average amount per claim jumped in 2013 and stayed at a high level since then.



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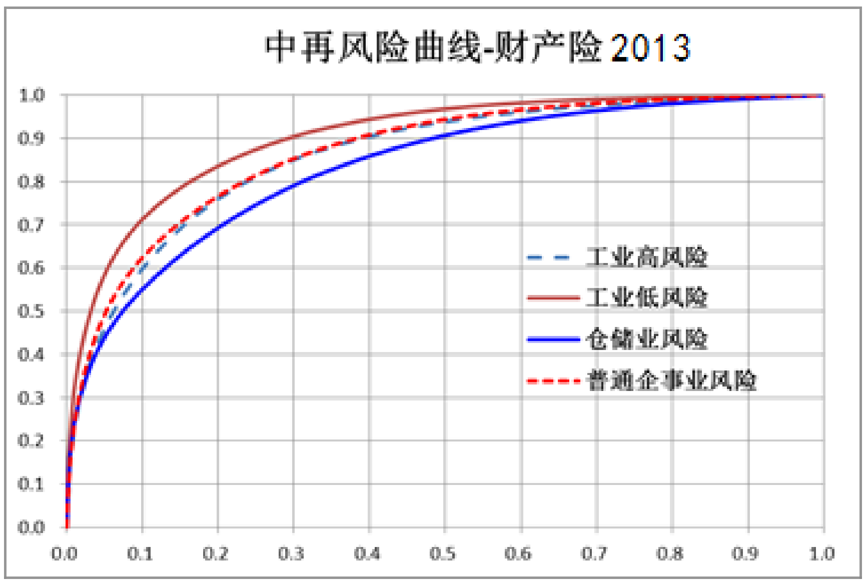
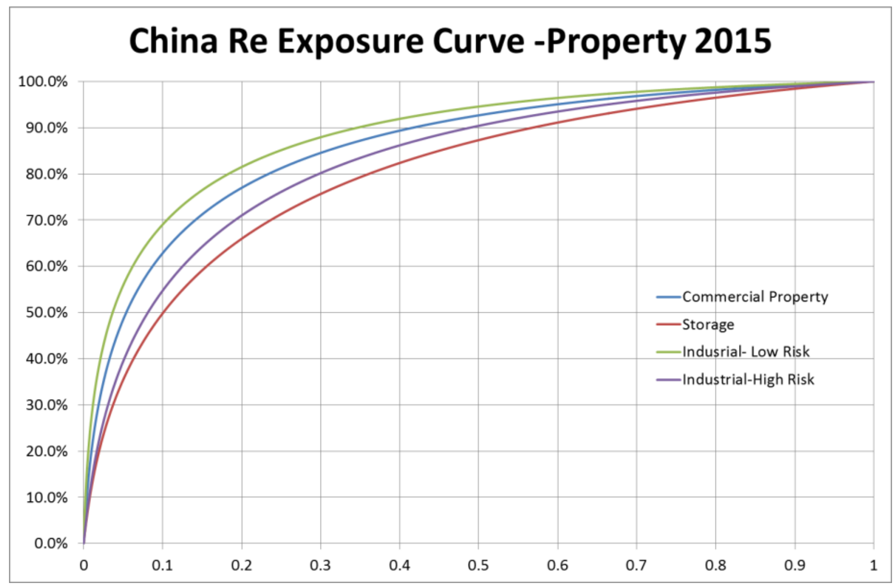
Update of Exposure Curves in 2015

- Based on the research mentioned previously, China Re P&C updated the property exposure curves in September 2015.
  - The updated curves were more close to the diagonal due to the increase of both claims frequency and severity.
  - The 2013 version was constructed using mixed exponential distribution curve fitting, and MBBEFD curve fitting and a kind of Wang Transform were utilised in the 2015 version.





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Issuance of First Cat Bond in China

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- On 1st July 2015, China's first catastrophe bond was issued by China Re on the international capital market, through Panda Re, a Bermuda-based special purpose vehicle.
  - The face amount of the cat bond is USD 50 million.
  - The cat bond covers risks incurred from earthquakes in China. Part of the earthquake insurance underwritten by China Re and its subsidiary was ceded to Panda Re, which then sought financing for the coverage on the bond market.

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Analysis of Cat Bond Pricing

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- Comparing the price of a cat bond and that of a cat reinsurance is not a simple job, although many people like to do that.
- In fact, comparing the coupon rate(C) of a cat bond with the rate-on-line(ROL) of a cat XOL reinsurance is like comparing apples with pears.

【An Illustration】Assume that the coverage period is one year and the coverage amount is 1 unit. The probability of an earthquake occurrence in a single year is q, and correspondingly p = 1 - q is the probability that no earthquake occurs.

Since the probability of earthquake occurrence is very low, while the severity of earthquake losses is extremely high, it is additionally assumed that the coverage amount will be exhausted for both the cat bond and the cat XOL once an earthquake occurs.

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Comparison without Time Value of Money

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- First, we compare the price of a cat bond with that of a cat XOL without taking into account the time value of money.

For the cat XOL, according to insurance pricing principles, ROL=1*q=q.

For the cat bond, according to bond pricing principles, there should be 1=(1+C)*p+0*q. That is, C=q/p.

Since p<1, it can be seen that C=q/p>q=ROL.

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Comparison with Time Value of Money

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- Then, we compare the price of a cat bond with that of a cat XOL with consideration to the time value of money.

For the cat XOL, ROL is the present value of the expected future catastrophe losses in the future. That is, ROL=1*q*v, where v=1⁄(1+i). Here, we can find the expression of the coverage, as 1 =ROL⁄(q*v).

For the cat bond, the net present value of all the future cash flows at time 0 should be zero, so we should have 1-(1+C)*p*v=0. Here, we bring the above expression of the coverage amount 1=ROL⁄(q*v) into the formula and get the relationship C=ROL*(1+i/q)*(1+i)/p.

Since (1+i/q)>1 and (1+i)/p>1, it can be seen that C > ROL.

- It can be concluded that for the same coverage the coupon rate of a cat bond should be higher than the ROL of a cat XOL.

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The Framework of C-ROSS

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- C-ROSS is the acronym of China's second-generation solvency regime, China Risk-Oriented Solvency System, which has gone into effect since January 2016.
- In the first-generation solvency regime, the required capital of an insurer was approximately 16% of its premium income, no matter which product line produced the premium income.
- Under C-ROSS, different product line has different risk capital factor and the overall required capital is computed using a correlation matrix framework.

$$C_{overall} = \sqrt{\sum \rho_{ij} * C_i * C_j}$$

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Capital Optimisation under C-ROSS

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- Under C-ROSS, the capital factor for the premium risk of motor/automobile line is around 9%, and that for non-motor line is around 20%.

- An interesting question arises for an insurer: in order to write as much premium income as possible with an unchanged capital capacity, should the insurer only write motor line because the capital factor for motor line is lower?

- Facing this question, many senior managers think the answer is "yes". In fact, however, it is not the truth.

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An Illustration of Capital Optimisation

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- Here an illustration is made in order to clarify the question.

An insurer write the overall premium income of CNY 100 million. The percentage of motor premium income is x%. We increase x% from 0% to 100% and calculate the required capital for the insurer correspondingly.

Keep in mind that the capital factor for the premium risk of motor line is around 9% and that for non-motor line is around 20%. Meanwhile, the correlation coefficient between them is 0.05.

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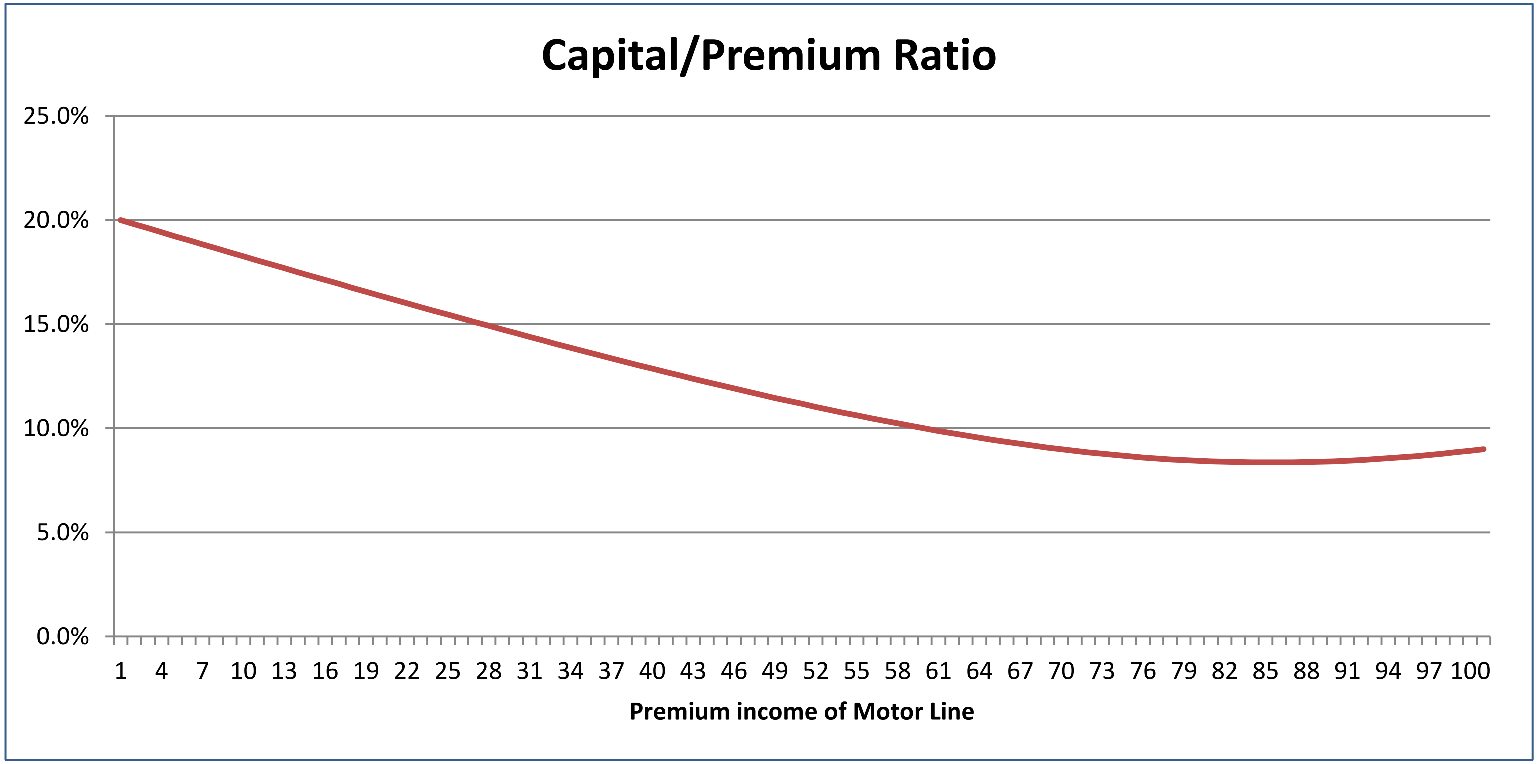
An Illustration of Capital Optimisation

- Some interesting phenomena could be seen. As the increase of motor premium, the required capital is decreasing at first. After certain point, however, the required capital begins to increase.
  - It can also be seen that the lowest point appears when x%=84.45%.



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Capital Optimisation and Reinsurance

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- Why did such phenomena appear?

  Answer: The Key reason is that the formula of the overall required capital is a quadratic equation, just like f(x)=a*x^2+b*x+c who has a minimum value.

- Therefore, if the insurer wants to reach that point, it must adjust the percentages/proportions of motor insurance and non-motor insurance business in its portfolio.

  - ✓ In order to realise that purpose, adjusting the marketing strategy is an approach.

  - ✓ When it is difficult to adjust the marketing side, however, the insurer could take advantage of reinsurance arrangements to optimise its portfolio. After all, the capital requirement is based on the portfolio net of reinsurance.

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Premium Income Taxation

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- Currently premium income taxes are implemented in the insurance industry in China.

The policyholder hands CNY 100 to the insurer. All the CNY 100 is accounted as premium income.

The insurer hands CNY 5 to the tax authority and keep CNY 95 in its own hand.

The tax authority gets CNY 5.

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VAT Reform

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- From 1st May 2016, premium income taxation will be changed to value added taxation.
- It is assumed that the cash flow of the policyholder is unchanged.

The policyholder hands CNY 100 to the insurer. But only CNY 94.34 is accounted as premium income as CNY 5.66 is the VAT.

↓

The insurer hands CNY 5.66 to the tax authority and keep CNY 94.34 in its own hand as premium income.

↓

The tax authority gets the VAT of CNY 5.66.

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Impact of VAT Reform to Expenses

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- Besides <u>premium income</u>, the amount of <u>expenses</u> will also be changed due to the reform of VAT. (Here it is assumed that the cash flow for the insurance agent is unchanged.)

The insurer hands CNY 20 to the agent, accounting all as expenses.

↓

The agent hands CNY 1 to the tax authority and keep CNY 19 in its own hand.

↓

The tax authority gets the Income Tax of CNY 1.

The insurer hands CNY 20 to the agent. But only CNY 18.87 is accounted as expenses and CNY 1.13 is the VAT.

↓

The agent hands CNY 1.13 to the tax authority and keep CNY 18.87 in its own hand accounted as income.

↓

The tax authority gets the VAT of CNY 1.13.

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Impact of VAT Reform

- Besides premium income and expenses, the amount of losses will be changed due to the reform of VAT, too. The size of the impact depends on the mode of claims for each individual insurer.

- As a result, loss ratios will be altered although its definition is still the ratio of losses divided by premiums. But the amount of losses and premiums are both changed.

- In the process of reinsurance pricing, the new premium amount and the altered loss ratios should be used when needed.

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Introduction of the Speaker

Xiaoxuan (Sherwin) Li

- He is currently the head of the actuarial department of China Re P&C, with a working experience of over ten years in insurance industry. Before the transfer to the actuarial team, he had worked in facultative and treaty underwriting team for five years. As well, he ever worked in London for less than a year.

- He is a fellow of the CAS, a fellow of the IFoA (UK) and a fellow of China Association of Actuaries (CAA). He is also a Certified Catastrophe Risk Analyst (CCRA) and a Microsoft Certified Systems Engineer (MCSE). He graduated from Nankai University (China) with a master's degree in actuarial science.

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