ATLANTIS PRESS
Advances in Social Science, Education and Humanities Research, volume 119
3rd International Conference on Economics, Social Science, Arts, Education and Management Engineering (ESSAEME 2017)

Study and Prevention of Systematic Risk of Insurance Industry of China

Yue Gu[1, a]

[1] Statistic & Mathematics Major, College of Liberal Arts and Science, University of Iowa, Iowa, IA52245, America

[a]email

Keywords: Insurance industry, Systematic risk, CoVaR, Quantile regression

Abstract. The insurance industry is a risk management industry which cannot be ignored in the financial system. It promotes the stable development of the market economy with its special social and economic compensation mechanism. Therefore, to explore the systemic risk of insurance industry can prevent the spread of financial risks and ensure the healthy development of China's market economy. The quantile regression of CoVaR has good pertinence to the measurement of systematic risk of insurance industry. Adopting the method of CoVaR, this paper took the China Life Property & Casualty Insurance Company Limited as the representative enterprise to measure and analyze spillover effect of the systematic risk of Chinese insurance company. The countermeasures from the realistic perspective were put forward to decrease the possibility of risk's breakout.

Research Background and Significance

The financial industry plays an important role in financing and resource allocation. With the global economic integration, the financial channels are more extensive, and the risks of the financial industry are also increasing. Facing the economic situation under the "new normal" in China, many investors regard the insurance industry as a safe haven to protect their assets, passing the risks to the insurance industry directly or indirectly. Therefore, this systematic risk measurement of China's insurance industry in the subject is of great value and significance.

China is a new big country of insurance industry. The systemic risk of insurance industry in China is representative. Moreover, to explore the systemic risks of China's insurance industry can provide a basis for preventing the spread of financial risks, improving the risk control mechanism of China's insurance industry and ensuring the healthy development of China's market economy. We can put forward some countermeasures from the practical point of view to reduce the possibility of risk explosion.

Research Content and Methods

Definition of Systematic Risks of Insurance Industry. The Geneva association gives three standards of scale, relevance and substitutability to make a comprehensive definition of the characteristics of systemic risk of insurance industry. International Association of Insurance Supervisors considers that the time should also be included in the impact factor. The systematic risk of the insurance industry does not have immediate impact, but will play a role in a long period of time. According to the four standard principles of scale, relevance, substitution and effectiveness, the systemic risk of the insurance industry has a more comprehensive definition. It is the devastating possibility of the direct impact or indirect impact on the whole insurance market and even the whole financial system brought by the systemic risk factors related with the insurance industry.

Component Parts Systematic Risks Accumulation of Insurance Industry in China. The paper selected the data from 2008 to 2015 to give a simply correlation judgement of premiums and GDP in that period.

Copyright © 2017, the Authors. Published by Atlantis Press.
This is an open access article under the CC BY-NC license (http://creativecommons.org/licenses/by-nc/4.0/).

Table 1. Premiums and GDP from 2008 to 2015 in China

Year	Premiums （billion Yuan)	GDP （billion Yuan)
2008	978.4	31951.6
2009	1113.7	34908.1
2010	1452.8	41303.0
2011	1433.9	48930.1
2012	1548.8	54036.7
2013	1722.2	59524.4
2014	2023.5	64397.4
2015	2428.3	68905.2

Table 2. Descriptive statistics

Variables		Statistic	Deviation	Standard error	Confidence intervals of 95%	
					Lower bound	Upper bound
Premiums （billion Yuan）	Mean	1587.7	3.4	159.3	1263.9	1910.2
	Standard deviation	471.1	-42.3	107.2	211.9	613.3
	N	8			8	8
GDP （billion Yuan）	Mean	50494.6	74.0	4624.3	40759.6	59098.3
	Standard deviation	13627.9	-1060.4	2308.0	7361.8	16557.2
	N	8			8	8

Table 3. Correlation table

Variables	Items		
Premiums （billion Yuan）	Pearson correlation	1	0.952**
	Significance (bilateral)		0
	N	8	8
GDP（billion Yuan）	Pearson correlation	0.952**	1
	Significance (bilateral)	0	
	N	8	8

According to the data correlation analysis, the premiums were significantly related to GDP of China in the years from 2008 to 2015. The trend of premium income growth was basically the same with the GDP growth. The insurance industry of China has significant periodicity. The link between bank and insurance has become more and more complex, which increases the possibility of various risks. The risk transfer effect among the two industries is becoming stronger and stronger.

From the perspective of premium income of five listed insurance companies from 2008 to 2015, the Table 4 shows the increasing impact of the insurance companies on the market.

Table 4. Chinese premiums and premiums of main insurance companies of China from 2008 to 2015 (unit: billion Yuan)

Year	China	China Life	PICC	Ping An	CPIC	NCI	Industry share (%)
2008	978.4	318.4	144.2	129.1	93.9	55.7	75.8%
2009	1113.7	318.1	178.1	173.0	101.8	66.8	75.2%
2010	1452.8	358.8	245.6	226.6	143.5	93.6	73.5%
2011	1433.9	348.6	248.3	207.4	154.8	94.8	73.5%
2012	1548.8	359.5	264.6	233.6	163.0	97.7	72.2%
2013	1722.2	371.2	305.9	268.7	176.7	103.6	71.2%
2014	2023.5	383.6	346.9	326.1	191.5	109.9	67.1%
2015	2428.3	425.8	386.5	385.7	203.0	111.9	62.3%

Data sources: National data network of National Bureau of Statistics and annual reports of the five insurance companies

Research Methods of Systematic Risk. We decrease the harm of the systematic risk in advance through the quantitative analysis of the systematic risk. The quantitative analysis of the systematic risk is the measurement of the possible loss degree of the particular institutions. At present, there are many methods for systematic analysis, including index analysis, network structure method and model method.

Quantitative Analysis of the Systematic Risk of Insurance Industry

Data Selection and Processing. The paper selects a listed company (601628) named China Life Property & Casualty Insurance Company Limited as the sample insurance company. It accounts for big ratio of insurance market with good representativeness and objectivity. We select the Shanghai stock composite index (000001) as the index of financial system.

Table 5. Monthly closing prices of China Life and Shanghai stock composite index

Time	Closing price of China Life	Shanghai stock composite index
2008/1/31	33.89	4383.39
2008/2/29	33.59	4348.54
……	……	……
2016/10/31	21.83	3100.49
2016/11/30	25.79	3250.03
2016/12/30	24.09	3103.64

Data resource: Database of Wind Financial Consulting

Table 6. Monthly return rate of China Life and Shanghai stock composite index

Time	Return rate of China Life	Return rate of Shanghai stock composite index
Feb. of 2008	-0.89%	-0.80%
Mar. of 2008	-26.95%	-19.50%
……	……	……
Oct. of 2016	2.82%	5.96%
Nov'. of 2016	15.87%	1.58%
Dec. of 2016	-20.93%	-8.90%

We take the monthly return rate of China Life as the independent variable x, the monthly return rate of Shanghai stock composite index as the dependent variable y. The linear regression analysis between the two sets of data is conducted via R analysis tool.

Table 7. Linear regression analysis between monthly return rate of China Life and Shanghai stock composite index

Call:					
lm(formula = y ~ 1 + x)					
Residuals:	Min	1Q	Median	3Q	Max
	-0.132726	-0.03906	-0.000088	0.033063	0.2369
Coefficients:	Estimate	Std. Error	value	Pr(>|t|)	
(Intercept)	0.0009759	0.006478	-0.151	0.881	
x	0.5842484	0.0388631	15.033	<2e-16 ***	

The linear relationship between the two variables is significant. Therefore, we can judge that the return rate of China Life has a significant impact on the return rate of the financial system. We will use quantile regression analysis to determine the extent of the impact.

Measurement Research. We establish the regression model of return rate sequences with quantile n=0.05. The comparison of systematic risks of China Life and financial system is as follows:

Table 8. Comparison results of systematic risks of China Life and financial system

China Life		Financial system	
$VaR^{i}_{0.05}$	-0.2197	$VaR^{j}_{0.05}$	-0.1598
$CoVaR^{i|j}_{0.05}$	-0.173	$CoVaR^{j|i}_{0.05}$	-0.1308
$\Delta CoVaR^{i|j}_{0.05}$	0.0467	$\Delta CoVaR^{j|i}_{0.05}$	0.029
$\%CoVaR^{i|j}_{0.05}$	21.26%	$\%CoVaR^{j|i}_{0.05}$	18.15%

Research Results. The results show that, in the market economy and free trade environment, the marketization degree of China's insurance industry has gradually increased. The risk of individual insurance institution may cause volatility of the whole industry. When the crisis breaks out, even the companies with good risk control capability may be seriously affected. The related research of this paper also laid the foundation for the preventive measures.

Suggestions Based on the Research Results

From the perspectives of insurance institutions and regulatory agencies, the paper puts forward the countermeasures of preventing systematic risk of insurance industry.

From the perspective of insurance institutions, we should improve the effectiveness of the internal control of insurance companies. Pay attention to the macroeconomic trend and adjust business strategy flexibility. Spread risk through reinsurance, insurance securitization and other ways. Control the ratio of high risk investment.

From the perspective of regulatory agencies, we should establish the monitoring system and mechanism of risk linkage to achieve the high efficiency of information analysis, communication, processing. Establish the mechanisms of information sharing and policy coordination among different industries to form resultant force. According to the actual situation of China's insurance industry, establish a comprehensive system of risk pre-warning indexes. Draw lessons from the international authoritative evaluation system to formulate the insurance institution evaluation method in accordance with the actual situation of China. Set up the more stringent regulatory indicators to achieve regulation of important insurance institutions.

References

[1] Bu Lin, Li Zheng. A Study of Systematic Risk Spillover of China's Listed Financial Institutions: A Comparative Analysis Based on CoVaR and MES [J]. Contemporary Finance & Economics, 2015(6): 55-65.

[2] Wei Guoxiong. The Identification and Prevention of Systemic Financial Risks [J]. Finance Forum, 2010(12): 5-10+49.

[3] Hu Bin, Geng Nan. Macro Prudential Frane and Financial Systematic Risk in China [J]. The Chinese Banker, 2012(9): 24-25.

[4] Guo Jinlong, Zhao Qiang. An Overview on Literature on Systematic Risk of the Insurance Industry [J]. 2014(6): 41-52.