Study on the Operating Mechanism of Catastrophe Compensation Fund

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Abstract: Under the situation of undeveloped catastrophe insurance and serious catastrophe risk in China, the operating mechanism of Catastrophe Compensation Fund (CCF) is studied systematically, which is based on the Pan Xilong’s study on CCF in 2010. The study focused on the classification of registration district, the calculation and adjustment of compensation ratio, the pricing of CCF certificates, etc. It shows that CCF is an innovational solution to deal with catastrophe risk in both the view of theory and practice.

Keywords: catastrophe risk, catastrophe compensation fund, registration district, compensational options, simulating research.

Introduction:

A catastrophe is the common problem for humankind and the losses resulted from it are increasing continuously. The losses caused by natural disasters were estimated about $5 billons in the 1970s and soared to about $22 billons from 1987 to 2003 for each year. The economic losses coming from catastrophes were $269 billons in 2008 and reached the record number of $370.8 billons in 2011. According to the statistics of UN, there were 8 in China among the 54 most serious natural disasters in the 20th century all over the world. The direct economic losses from natural disasters were 2.48% of Chinese GDP and about one fifth of growth of GDP on average in the 20 years from 1990 to 2009. However, the mechanism to cope with catastrophe in China is very backward.

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At present, China mainly depends on the governmental fiscal transfer payments and direct relief to deal with catastrophe without effectively utilizing the risk-diversifying and transferring mechanism of social forces, insurance, global financial markets. But catastrophes are out of our control and we must face up to the shock of catastrophe risk at any time. Based on the Pan Xilong’s study on Catastrophe Compensation Fund (CCF) in 2010, the operating mechanism of CCF will be studied further with help of simulation in the essay and the feasibility, reliability, efficiency and sustainability of CCF will be analyzed in more detail and depth.

1. An Overview of Catastrophe Risk and Coping Mechanism

In the face of catastrophe risk, the modes adopted by each country to deal with it are classified into three types: government-led, market-led, combination of government and market. The specific schemes such as catastrophe insurance and reinsurance, catastrophe insurance fund, catastrophe-linked security, catastrophe structural fund, CCF and so on were put forward by domestic scholars.

1.1 The government-led coping mechanism for catastrophe risk

Because there are understanding deviation between the suppliers and demanders and serious information asymmetry in the market of catastrophe risk, it makes catastrophe risk uninsurable, which was showed by Kleindorfer and Kunreuther (1999), Kunreuther (2006), Browne and Hoyt (2000), Auffret (2003). Tian Ling, Xing Hongyang and Gao Jun (2013) showed that insurability of catastrophe risk is very poor because of its characteristics such as ambiguity, low probability and large loss, and difficulty to pool the risk.

Zhuo Zhi and Wang Hualan (2012) thought that catastrophe risk management is closer to public goods between private goods and public goods. Gao Haixia and Jiang Huiping (2011) believed that risk-diversifying from time and space dimension is the first financial function for coping with catastrophe risk and governments have a comparative advantage in risk-diversifying of time dimension. They all included that governments are needed in order to deal with catastrophe risk.

The modes of Earthquake Commission of New Zealand, flood and nuclear insurance in the United States are the model of Government-led mode to deal with catastrophe risk in practice. From the practical effect, the mode of Earthquake Commission of New Zealand is very efficient with low management cost and insurance rate. Common people can afford the earthquake insurance and insurance rate is very high. More than 90% of residential houses and about 80% of indoor properties are insured. Because there is no difference on the insurance rate, it can’t effectively encourage people to take the measures of disaster-prevention and relief. So it needs to be improved further. The mode of America flood insurance works well in terms of providing risk-safeguarding, reducing flooding risk exposure, saving spending of federal government on disastrous relief and flooding control. Through the differential insurance rate, it can effectively encourage people to make the prevention and relief for disaster. Because of a single loss-taker and catastrophe loss with a long tail, national flood insurance program is with heavy debt. The mode of America nuclear insurance community works efficiently and provides good safeguarding for nuclear risk. In the nuclear accident of Three Mile Island, the victim got enough compensation.

1.2 The market-led coping mechanism for catastrophe risk

Although the government-led coping mechanism for catastrophe risk has its theoretical and practical basis, Priest (1996) argued that it is very difficult for government to carry out the scientific management principles due to the limits of political and social reasons, which makes its coverage and scale far wider than private insurance companies do. The
correlation of subject-matter insured may make it face the risk of significant losses. So he thought that the mechanism completely dominated by government also has its limits. ZhuoZhi, Wang Huanan (2012) put forward that the biggest advantage of leading people to make rational decisions by price signal is that it can significantly improve efficiency, including quality improvement, product diversification, more flexible production, wider penetrating, and so on. Gao Haixia, Jiang Huiping (2011) also thought that catastrophe compensation by market as more economic efficiency, including the more certain compensation extent, faster compensation speed, higher operating efficiency of compensation funds, etc.

Wang He, Wu Chengpi and He Hua (2013) put forward systematic scheme for catastrophe risk safeguarding on the basis of catastrophe insurance, reinsurance. However, because of system design, economic level, and people’s knowledge about catastrophe insurance and so on, the market penetration rate of catastrophe insurance is very low. Premiums are severely short and the scale of claims reserve is too small. So it plays a very limited role in the catastrophe loss compensation. For example, in the direct economic loss of RMB 845.1 billion in WenChuan Great Earthquake in 2008, the insurance compensation is only RMB 1.8 billion, accounting for just 0.21%. So in the short term, catastrophe insurance and reinsurance are difficult to play the main role in catastrophe risk safeguarding. ZhuoZhi (2011) put forward the scheme of catastrophe insurance fund. The difference from scheme of Wang He etc. is that through the collection and accumulation of premium, the reserve fund can be set up to deal with catastrophe risk and the ability to cope with catastrophe risk can be enhanced for the insurance system. But collection and accumulation of premium in the scheme are also based on the development and maturity of catastrophe insurance and reinsurance. In addition, Xie Shiqing (2011) put forward that the ability to cope with the catastrophe risk can be enhanced by developing catastrophe-linked securities for fully using the huge capacity of capital market. But on the one hand, catastrophe-linked securities are limited by the obstacles of regulatory and tax, on the other hand, this model needs high technical, and China’s financial markets are not mature enough, as well as public welfare is considered inadequately for ordinary citizens. Therefore, it’s hard to become the main means of dealing with it.

In practice, in British flooding insurance mode, the boundaries between government and market are very clear. The mode is very efficient with good coordination and operation mainly by market. In the meantime, premium rate is low. So the public insurance rate reaches about 80%. The operation of California earthquake insurance mode is overall good, but due to high earthquake risk and reinsurance costs, premium rate is relatively high. So the insurance rate is low, only about 10%. Norway insurance mode operates efficiently with more than 60% of the natural disaster loss paid by the insurance. Insurance industry and customers are very satisfied with the arrangement of system of natural disaster community.

1.3 The coping mechanism with combination of government and market for catastrophe risk

ZhuoZhi, Ding Yuanhao (2011) pointed out that in the pure market framework, catastrophe risk cannot be insured and is difficult to be taken on; and only within the framework of catastrophe risk management with the participation of government and capital market, catastrophe risk becomes insurable and has a limited amount of affordability. In the market promoting theory, Lewis and Murdock (1999) argued that although private insurance market can reach the dual purpose of loss compensation and encouraging mitigation of disasters, it only partially solves the problem of catastrophe loss compensation due to its limitation. Government has the ability to allocate resources and make social wealth redistributed after a disaster, but it produces moral hazard and restricts the development of private insurance market. Gao Haixia, Jiang Huiping (2011) present the necessity of compensation for risk with the combination of government and market from the three aspects of attributes of catastrophe risk, financial function view and the market
failure, pointing out that any single market or government financial compensation mechanism cannot take on the catastrophe loss compensation. Therefore, only by carrying on the integration of market and government, can we effectively cope with the catastrophe risk. Tian Ling, Li Jianhua (2014), by using the principle of structural funds, put forward a new thought of catastrophe structural funds, but the plan is not clear at the boundaries of government and market, and the loss-sharing mechanism is also not clear, as well as the integration of the government, insurance market and capital market is inadequate.

In practice, Florida in the USA uses a method of combination of government and market. That is, the government sets up the Florida hurricane catastrophe fund, providing hurricane reinsurance for private insurance companies; private insurance companies provide hurricane insurance for people. Through the tax exemption the government reduces the reinsurance premium rate, and finally reduces the premium rate. It solves the problem of the shortage of hurricane catastrophe insurance and promotes the stability of the hurricane insurance market.

It can be seen through comprehensive comparison for the former three modes: with catastrophe risk safeguarding provided by the government alone, it is very inefficiently and wasteful. There are many cases of fraud and misusing relief supplies repeatedly taking place in the process of dealing with catastrophes in China. While with catastrophe risk safeguarding provided by the market alone, there exists too much supply volatility, and it is difficult to guarantee the sustainable development. For example, in the flood and earthquake insurance of United States, in the early days when it only relied on the market, the situation of supply disruptions once happened. Whether from theory or from practice of all countries it shows that the combination of government and market is the best mode of dealing with catastrophe risk.

2. The Characteristics of CCF System

Pan Xilong (2010) designed the mode of CCF that has the characteristics of comprehension, wide coverage, sustainability, efficiency and can give attention to both public and commercial benefits with help of principle and method of financial engineering and combination of characteristics of the fund, insurance and securities, and other financial instruments. Here is a brief introduction to the system as the foundation of further study.

2.1 The operating mode of CCF

CCF Company is set up by the government. It is responsible for the operation and management of CCF. Its duty includes issuing CCF shares to investors, catastrophe bonds, and compensating investors who suffer a disaster, etc. The core mechanism of CCF is that the social account when no catastrophe pays a certain percentage of profits to the national account in order to gain the right of compensation multiplied by the held fund when suffering from a catastrophe. The basic mode is shown in figure1.

2.2 The main characteristics of CCF

The main features of CCF include the system of registration district, double account, compensation options, semi-close, public welfare compensation priority, etc. Among them, the system of registration district is a solution designed for solving the difficulty of actuarial of catastrophe risk for each specific policy-holder. Its aim is not to pursue for each policy-holder’s accurate measurement of catastrophe risk, but a more realistic and reliable solution with a certain acceptable accuracy. The particular way is that the country is divided into different parts and classes according to different
probability and expected loss of catastrophe risk. According to the catastrophe information and the change of catastrophe risk in the future, these partitions can be adjusted accordingly. Social investors when buying CCF shares must be specified the registration district of CCF share according to their risk exposure. When necessary, the investors can change the registration district of the share. This design fundamentally overcomes the technical barriers of no insurability of catastrophe risk, greatly reducing the high cost in the process of precise measurement for individual policyholder’s risk in the traditional insurance industry.

Double account means that national account and social account are set in CCF Company with unified management and independent accounting. The national account mainly consists of national fund, charitable donations, catastrophe special tax and their revenues, as well as the profits taken from social account on a regular basis. Social account mainly consists of the money of fund share bought by social investors and its revenue deducted by the revenue paid to national account. The key to double account design is that the social account pays part of the profits regularly to exchange the compensation right of a multiple of net value of share from national account when it suffers from catastrophe. The special note is, when a catastrophe happens, the compensation funds to investors come from the national accounts, without direct relations to the social account, which makes the social account successfully avoid a direct hit from a catastrophe risk, and lay a solid foundation for the construction and steady operation for secondary market of CCF.

The compensation options of CCF refer to the compensation right of a multiple of net value of share from national account when they suffer from catastrophe through paying the part of profits regularly to national account. It can also be seen as multiple periods, continuous option contracts. The part of revenue paid to national account can be regarded as the premium of compensation option for a period. The biggest loss investors can suffer in a certain period is the revenue paid to national account. The possible benefits are the compensation with several times own fund share.

Semi-closed means that fund share of investors of CCF can be redeemed on condition that registered district of the investors’ fund share is the catastrophe-stricken place, otherwise, it shall not be redeemed, and only through the
secondary market can it be sold. This design aims to enhance the stability of social accounts and increase the proportion of long-term investment for obtaining higher yields and strengthening the capacity of accumulation of national accounts.

The priority of public welfare compensation means that national account should compensate all the catastrophe-stricken people with a certain proportion before commercial compensating of social investors with certain ratio, to ensure that all victims during disaster have the basic life safeguarding.

Together, CCF solves the difficulties of no insurability of catastrophe risk with the consent of system of registration districts, direct impact of catastrophe risk on the secondary market with double account, the problem of stability and profitability of social account funds with semi-closed design, the compatible problems of commonweal and commerce with public welfare compensation priority.

**3. The Operating Mechanism of CCF**

The committee of investors of CCF that is elected by all investors according to their shares of CCF is the core and highest authority. The professional committees are comprised of experts in the related field who are elected and hired by the committee of investors of CCF. The managers and board of supervisors are also elected by the committee of investors of CCF. The basic operating mechanism of CCF is showed in figure 2.

The professional committees are consisted of committee of expert of catastrophe risk, management of registration district, compensation and price, management of investment and outsourcing, risk management. In terms of committee of expert of catastrophe risk, branches can be set according to different catastrophe. The professional committees take on their respective duties and are directly responsible for the committee of investors of CCF.

The board of supervisors is also elected by the committee of investors of CCF and responsible for it. The duty of the board of supervisors is to supervise the professional committees and managers as well as find, correct problems in the run in time.

The managers are responsible for operation of daily business of CCF. There are various functional departments subordinated to the managers. They take on respective duties. We don’t want to discuss about it in detail due to limited page.

Once disasters take place, the level of the disaster is verified by the branch of expert’s committee of catastrophe risk at first. If the disaster is a catastrophe, the scope influenced by it is rapidly determined. Then the related information of registration district in catastrophe is published by the committee of management of registration district. The following step is to announce the compensational standard of public welfare and business in different registration district by the committee of compensation and price according to what has happened. The financial department of CCF firstly pays public subsidy to relief agencies that carry out public relief with the money. Meanwhile, the net value of fund of investors in the catastrophe is calculated by the financial department of CCF. According to the published compensational standard, the amount of compensation is figured out and compensational work is carried out rapidly. Finally, the information before, in and after catastrophe is collected, sorted and analyzed by information department; the compensational work, effect and problems of each catastrophe are studied; the special report is finished and submitted to the committee of investors of CCF for documentary. The information related to the catastrophe is published to people in time.
Figure 2 The operating mechanism of CCF

The compensational procedure of CCF is showed in figure 3.

Figure 3 The compensate procedure of CCF

Conclusion and Discussion
In conclusion, in the CCF, such institutional arrangements as registration district, double accounts, and priority of public compensation target respectively solve the problems of non-insurability of catastrophe risk, direct shock of catastrophe risk on secondary market, taking both commonweal and commerce into account. Furthermore, such financial instruments as options, funds, bonds and stocks are integrated together and semi-closed fund with option of catastrophe compensation is created, which can solve the contradiction between huge losses and diversification, and make the foundation of system and tools for dispersing, transferring and sharing of catastrophe risk across the whole country and world.

**Reference**

6. Wind Database: China Environment Database (EPS)