

China Catastrophe Insurance: A Boost to Green Insurance Development under ESG Concept

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Abstract: *China urgently needs to develop catastrophe risk management due to the frequent incidence of disasters over the past 50 years, but insurance now only plays a small part in this process. Disaster insurance is a crucial piece of green insurance as well as a strategy for managing catastrophe risk and compensating for catastrophe losses. Academics are currently researching China's catastrophic insurance system using ESG, a novel theory of economic development. The topic of this thesis is catastrophe insurance using the conventional definition of a natural disaster, and it makes creative recommendations for the implementation of a catastrophe insurance system.*

Keywords: *Catastrophe Insurance, ESG, China, Green Insurance*

1. Introduction

With a large land area and complex climatic conditions, China is a country prone to natural disasters, with many types of disasters, high frequency of occurrence and wide geographical distribution. At the same time, China has a large population, so the losses caused by natural disasters are even more serious. In the first half of the year, various natural disasters caused a total of 39,143,000 people affected, 178 people died and disappeared due to the disaster, 1,282,000 people were relocated in an emergency, 18,000 houses collapsed, 3618.9 thousand hectares of crops were affected, and direct economic losses were 88.81 billion yuan. [1]

However, in the context of socio-economic and technological development, catastrophe risk damage has not only not reduced, but also become more and more complex and serious. Catastrophe risk has become a difficult problem for economic development, social governance, people's life and national security. Catastrophe risk has always been an important area of social governance in China, especially public risk governance.

The concept of ESG was first introduced by the United Nations Global Compact in 2004. Environmental, Social and Governance, abbreviated as ESG, is a concept that focuses on the mutual integration of the environment, society and governance. These three dimensions are important components of the green financial system.

2. Overview of Catastrophe Insurance

2.1. Definition and necessities

Green insurance in a narrow sense usually refers to a specific type of insurance, namely "environmental pollution liability insurance". In a broader sense, green insurance is a kind of sustainable development insurance, which usually refers to various kinds of insurance related to environmental risk management. China's green insurance has formed the traditional green insurance products such as environmental pollution liability insurance and catastrophe insurance. Green insurance is actually the use of insurance as a sustainable development tool to address a range of issues related to the environment and climate, such as environmental improvement, response to climate change and efficient use of resources. The Chinese insurance industry has developed innovative products such as catastrophe insurance, environmental pollution liability insurance, carbon insurance, forest insurance and ecological insurance, and has developed catastrophe insurance models and built digital service platforms.

Catastrophe insurance is an insurance act in which the parties agree that one party will pay premiums to the other party, and the party receiving the premiums will be obligated to pay for damages caused by a sudden, unpredictable, and unavoidable catastrophic event with particularly severe consequences. [2]

In the past decade, the average annual direct economic loss caused by natural disasters in China is nearly 350 billion RMB, with the highest annual direct economic loss reaching a trillion RMB [3], of which more than 80% originates from extreme disaster events caused by climate change (see Figure 1). In addition to this, the affected area is huge, which seriously affects people's life and production. (See Figure 2.) Catastrophe insurance is more maturely developed mainly for agricultural insurance, which insures mainly major crops such as rice, wheat, cotton, and major livestock types such as pigs and cows, with the widest coverage, and the national agricultural insurance coverage level has reached 23.21% [4]. According to the Swiss reinsurance company, sigma, the global insurance industry pays out an average of 20% - 40% of total economic losses for natural disasters. [5]

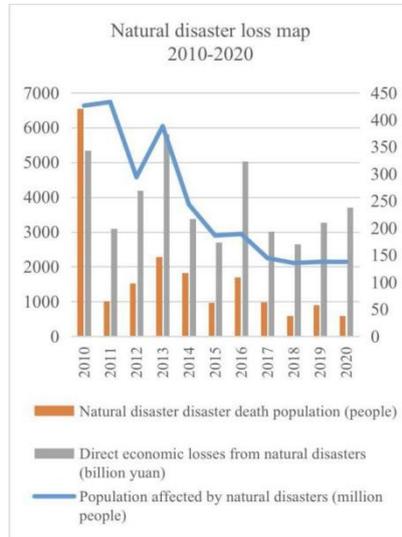
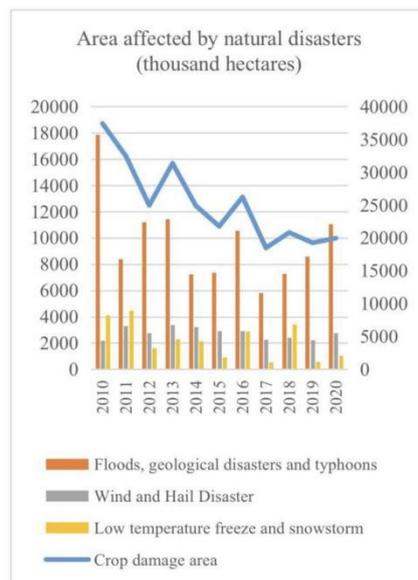


Figure 1: Natural disaster damage map



Data source: National Bureau of Statistics of China

Figure 2: Area affected by natural disasters

China has always attached great importance to catastrophe risk management, which additionally includes the construction of catastrophe insurance. The catastrophe here mainly refers to natural disasters that cause serious impacts such as earthquakes, tsunamis, mudslides, mega-floods and mega-storm surges. Currently, catastrophe risk is defined internationally as an event that results in direct insured losses to property exceeding \$25 million and affects a wide range of insurance and insured persons. [6] Some scholars have equally extended the scope of "catastrophe insurance" to historic medical events, such as COVID-19 health insurance [7] and the will on in the of disasters in this.

The People's Insurance Company of China (PICC) mainly promotes the development of catastrophe

insurance, implements the "Catastrophe Insurance Business Expansion Plan", accelerates the development of local catastrophe insurance, and covers 60 cities and 207 million people in the first half of the year, an increase of 17.4%. [8] At 1252 GMT on September 5, 2022, a 6.8 magnitude earthquake occurred in Luding County, Ganzi Tibetan Autonomous Prefecture, Sichuan. After the disaster, PICC attached great importance to improving the disaster area to resume ordinary life and production as soon as possible. PICC started the emergency plan at the first time, set up a leading group for emergency work, quickly formed a active group to rush to the disaster area, mobilized system resources and set up 4 temporary reporting points at the site. At 14:29 p.m., PICC Sichuan offered the first compensation after the earthquake, less than 2 hours after the earthquake. By 15:30, PICC had received seven reports from customers. This applies the ESG development concept and copiously illustrates the importance that the Chinese government and insurance companies attach to catastrophe insurance.

2.2. Historical Development

Objectively, China's catastrophe insurance system is still not definitively established and is still in its initial stage. Peculiarly, see Table 1 for each period.

Table 1: Major Events in the Development of Catastrophe Insurance in China

Stage	Time	Events
Early Establishment	1949	The People's Republic of China was founded and began to create a catastrophic insurance system.
	1959	In the past ten years, the People's Insurance Company of China (PICC) has opened catastrophe insurance. At the same time, to protect the safety of agricultural production, the insurance coverage provided by agricultural insurance also covers catastrophe risks.
Recovery Development	1979	The domestic insurance business was fully resumed, and the liability scope of property insurance, motor vehicle insurance, ship insurance, cargo transportation insurance, household property insurance and agricultural insurance in this period included catastrophe risks such as floods and earthquakes. Therefore, the construction of China's catastrophe insurance system has resumed and taken shape in this period.
	1995	The enactment of the Insurance Law required insurance companies to stop providing earthquake insurance. However, the construction of a catastrophe insurance system beyond that continues.
	2006	The "Opinions on the Reform and Development of the Insurance Industry" issued by the State Council clearly indicates that insurance has an irreplaceable role in enhancing society's ability to withstand risks, and that China should proceed to establish a catastrophe risk insurance system that combines policy support and financial subsidies.
Rapid Development	2008	After the Huaihe River Basin Flood in 2007 and the Wenchuan Earthquake in 2008, the country carried out a lot of basic research and design work before launching the first pilot projects in China in 2012. In fact, the earthquake catastrophe was the initial starting point for exploring catastrophe insurance in China's history. At the heart of the challenges faced by the pilots was the solvency dilemma, which was difficult to develop due to the lack of practical solutions and the disadvantage of government departments in terms of professional capacity.
	2011	The "National Comprehensive Disaster Prevention and Mitigation Plan (2011 - 2015)" issued by the State Council also clearly states: "Enhance the role of insurance in disaster risk management, significantly increase the ratio of natural disaster insurance payouts to direct economic losses from natural disasters, establish a sound disaster insurance system, give full play to the role of insurance in disaster risk transfer, broaden the channels for disaster risk transfer, and promote the establishment of a standardized Reasonable disaster risk sharing mechanism."
	2013	The "Decision of the CPC Central Committee on Several Major Issues of Comprehensively Deepening Reform" adopted at the Third Plenary Session of the 18th CPC Central Committee clearly proposes to "improve the insurance economic compensation mechanism and establish a catastrophe insurance system."
	2014	The "New National Ten", clearly proposed to accelerate the construction of catastrophe insurance system.

Since then, Shenzhen, Ningbo, Yunnan, Sichuan, Heilongjiang and Guangdong have carried out pilot catastrophe insurance systems in different forms. It is worth mentioning that the representative pilot area

for multi-hazard catastrophe insurance is Shenzhen, which has carried out three phases of catastrophe insurance as of 2020. The insured is uniformly the government, and the model is one chief underwriter and multiple insurance underwriters.

2.3. Governance model

Catastrophe risk management is divided into three stages, including before, during and after the disaster (see Table 2). In this process, the environment, society and governance are integrated, which fully reflects the development concept of ESG.

Before disaster occurs, it is mainly reflected in disaster prevention, including engineering and non-engineering means, especially legislation, standards, education and publicity, as well as the establishment of market-based incentive, supervision and checks and balances to promote catastrophe risk management. We will attract professional and technical talents, actively collect data, develop and manufacture public products for disaster prevention and loss reduction.

When a disaster occurs, it is mainly reflected in emergency response, including rapid response, rescue and relief, and loss control.

After a disaster occurs, it is mainly reflected in post-disaster recovery and reconstruction. Professional personnel is immediately organized to assess the extent of the disaster and the loss and actuarial calculation, and claim settlement procedures are quickly initiated to unify the payment responsibilities of all risk dispersive subjects. It plays the role of overall planning on the whole. In particular, the raising of reconstruction funds.

Table 2: Stages of catastrophe risk governance

Timeline	Highlights	Government		Insurance companies
Before the disaster	Disaster preparedness	Engineering	Weakening of the disaster: construction of floodplains, afforestation Protecting the affected body: house reinforcement works	Implementing systems, promoting publicity and education, training actuarial personnel, developing new types of insurance, and building catastrophe insurance models
		Non-Engineering	Formulate laws and regulations, set standards, develop plans, clarify master plans, and strengthen the qualification management of units	
			Incentives, monitoring and checks and balances, Development and production of public goods for disaster prevention and mitigation	
			educating, informing, and developing talent, and actively collecting data that	
When	Emergency Response	Rescue and relief, damage control and material supply		Rapid response, auxiliary material security
After the disaster	Recovery and reconstruction	Reconstruction fund raising		Assessment of losses, including the extent of the disaster, losses; claims settlement

3. Existing problems and international experience to learn from

3.1. The legal system is incomplete

Some scholars point out that nowadays, China has set up policy insurance for catastrophe insurance to ensure that risk losses are compensated and risks are differentiated. [9] Currently, China has enacted

more than 20 legal norms related to disaster emergencies, including the Regulations on Prevention and Control of Geological Disasters, the Law on Earthquake Disaster Prevention and Mitigation, and the Law on Emergency Response, all of which deal with catastrophe insurance. [10] However, there is no provision for the specific implementation and coverage of catastrophe insurance. The degree of perfection of the system, especially the legal norms, will largely affect the actual effect of catastrophe insurance [11].

The English catastrophe insurance legal system can be traced back to the first law regulating flood insurance, which was issued in 1531. [12] The passage of the Federal Flood Insurance Act of 1956 in the United States was followed by the passage of the National Flood Insurance Act, the National Flood Insurance Program, and a series of other laws related to catastrophe insurance. [13] Japan enacted the Earthquake Insurance Act in 1966 and subsequently passed a series of laws and regulations on catastrophe insurance such as the Law Relating to Earthquake Insurance. [14] It can be seen that the laws related to catastrophe insurance in developed countries started early and developed for a long time and have established a relatively perfect catastrophe insurance system.

Relatively speaking, China's insurance market is underdeveloped, and the number of insurance institutions and practitioners, though large, is not sufficiently developed. (See Figure 3.) There are nearly 90 properties and casualty insurance corporations in China, and each province also has about 30 property and casualty insurance companies operating with a certain level of underwriting capacity. However, in recent years, insurance companies have experienced slow premium growth, as shown in Figure 4. (Note: The number of employees does not include marketing and agency personnel.)

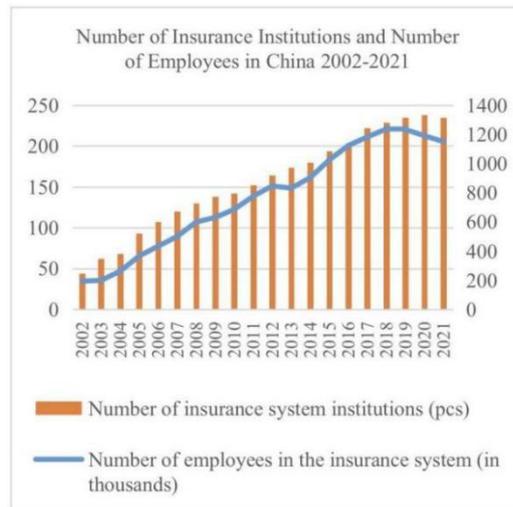
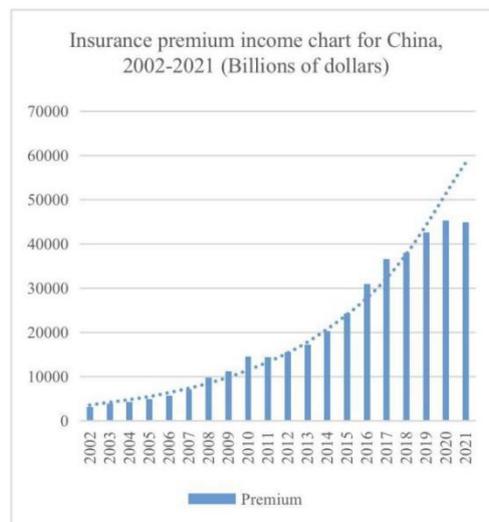


Figure 3: Number of insurance institutions and number of employees in China, 2002-2021 decade



Data source: National Bureau of Statistics of China

Figure 4: Premium Income Chart

3.2. Lack of special fund management

The finance department has also not established a special fund for catastrophe risk response. [15] The development model is not clear enough. Catastrophe insurance models in the world are mainly divided into: government-led model, government-insurance company cooperation model, and commercial insurance company model (see Table 3). The United States is government-led, Japan and New Zealand are cooperated by government and insurance companies, and Germany catastrophe insurance implements cooperation between insurance companies and professional reinsurance companies. 2010-2019, the economic loss and insurance payout of global weather disaster events are \$1,618 billion and \$601 billion, respectively, and the coverage rate has reached 37% [16]. It can be seen through Table 3 that there is no absolute dominant model for the development of catastrophe insurance in the world, and different types of insurance can have different development models.

Table 3: Classification of catastrophe insurance development models in the world

Leading	Mode	Representing the country	Representative Insurance
Government	Policy laws and regulations	The United States	Flood insurance, USA New Zealand Earthquake Insurance
Government + Market	Government + Insurance Company	Japan, New Zealand	Japan earthquake insurance, the Earthquake Insurance in Taiwan, China
Market	Commercial Insurance Companies	Germany	UK Flood Insurance, US Plus California earthquake insurance system

3.3. Weak awareness of insurance among the population

Low public recognition and insufficient demand. The insured rate of flood insurance in the UK in 2022 is as high as 80% [17]. In the United States, as of April 2010, more than 5.5 million households, mainly in Texas and Florida, were enrolled in the National Flood Insurance Program, with a total insured amount of more than \$800 billion. [18] Information shows that approximately 4.34 million flood policies are sold nationwide each year in the United States, with flood insurance premium revenues of \$1.6 billion and floodplain communities insured at more than 90%. [19] In contrast, for a long time, the insurance compensation rate of catastrophes in China has basically not exceeded 5%, and the insurance payout rates during the 2008 southern snowstorm and Wenchuan earthquake were only 3.3% and 0.19%, respectively. [20]

Chinese citizens' weak awareness of risk prevention and reliance on government bailouts make the demand for catastrophe insurance very limited. The literature suggests that the government's engineering preventive behavior significantly reduces individual demand for catastrophe insurance. [21] (See Table 2 for details) This means that the government's behavior in disaster prevention and mitigation may have a "charity hazard" (Charity Hazard), i.e., individuals are overly dependent on the government, which in a sense reduces individuals' demand for catastrophe insurance and is detrimental to the development of catastrophe insurance. [22] Economic factors, such as personal income, housing resilience, and disaster experience, are the main factors affecting demand. [23]

4. Suggestions for promoting catastrophe insurance in China

The public attribute of catastrophe risk governance needs to be clarified with the aim of preventing catastrophe risk governance from being simply handed over to the market [24]. The focus of catastrophe insurance system construction is firstly on funding, and secondly on post-disaster cooperation between the market and the government, which should fully mobilize and utilize the enthusiasm of the society and the market. The implementation of a catastrophe insurance model combining government and market is a more successful catastrophe insurance system. A two-tier management model should be established, i.e., a national and provincial two-tier fund to achieve differentiated coverage by making full use of local resources in a localized manner. It takes into account the differences in catastrophe risk and financial capacity of each province, while ensuring the relative fairness of catastrophe risk fund distribution. The national catastrophe insurance fund can manage, coordinate and support the provincial catastrophe insurance fund through reinsurance. [25]

Catastrophe insurances in China can be divided into residential catastrophe insurance and corporate catastrophe insurance [26]. Enterprise catastrophe insurance is handed over to the market for operation and voluntary insurance and underwriting. In contrast, the risk diversification mechanism of the

residential catastrophe insurance system can learn from the relevant experience of Japan and establish a layered model in which multiple entities such as the government and the market share the risk. The multi-level catastrophe risk diversification mechanism consists of the government, insurance companies and reinsurance companies. The government mainly takes the responsibility of subsidies and reinsurance in the catastrophe insurance underwriting system, while insurance companies are responsible for operating specific insurance business and selling catastrophe risk policies in the market.

Establish a catastrophe management committee, which can be set up with reference to the earthquake claims service center in Japan. Manage a comprehensive catastrophe insurance fund. It is a more successful experience to build a catastrophe insurance system with quasi-public product characteristics by focusing on the accumulation and supply of post-disaster reconstruction funds under the leadership of the government and through cooperation with the commercial insurance market.

Rich fund mechanisms, capital market instruments, and derivatives should be established, and international capital markets should be used to continuously try to securitize and transfer catastrophe risks through insurance-linked securities or derivatives such as catastrophe futures, catastrophe options, catastrophe swaps, and catastrophe bonds. [27]

Establish a platform for a coordinated mechanism, i.e., the National Catastrophe Insurance Fund and its Council, which has both the concept of a capital account and the function of coordination, guidance and coherence. In terms of concrete implementation, the National Catastrophe Insurance Fund Council could also rely on the China Insurance Guarantee Fund Liability Company Limited. The logical basis of this arrangement is the claim of the China Insurance Guarantee Fund, especially the property insurance industry guarantee fund, which has certain genetic similarity characteristics with catastrophe risk governance. In addition, as of December 31, 2021, the fund balance was 182.998 billion yuan, of which property insurance fund was 113.089 billion yuan, or 61.80%, and life insurance fund was 69.909 billion yuan, or 38.20%. [28] Therefore, China Insurance Guarantee Fund Limited Liability Company, as the management organization of China Insurance Guarantee Fund, has already accumulated and established a good foundation for a long time, both in terms of fund scale and organization, as well as in terms of technical capacity and management level.

Incorporate insurances into the national emergency response system and coordinate insurance and financial emergency response, meteorology, water conservancy, earthquake, and other related departments to form a larger, unified catastrophe risk governance system. [29] Information sharing, systematic cooperation in disaster data specification, disaster early warning, risk identification, and disaster mitigation and relief, and data and technical support for insurance companies to develop high-quality actuarial models and pricing tools for catastrophe insurance.

Technological innovations. Develop catastrophe information management system. 2009 "Catastrophe Insurance Data Collection Specification", reasonably use modern mathematical methods, statistical methods and simulation methods, etc. to design catastrophe insurance system and establish a large database for catastrophe information management. Various mathematical models are introduced to derive the optimal solution in a timely manner by combining the data stored in the system. Immediately after the disaster, determine the damage and formulate the insurance payment plan, allocate the insurance benefits that should be paid by each payout entity, and urge each payout entity to pay the full amount of insurance benefits in a timely, open and transparent manner. Strengthen the connection between the insurance industry and the national emergency, water conservancy, earthquake, meteorological and other departments.

5. Conclusions

In the context of climate change, scholars all over the world are using the environmental, social and governance (ESG) approach to research. By leveraging the advantages of insurance, they are contributing to the transformation of the global mode of production and way of life to embark on the road of green development. This study reviews and analyzes the development, implementation and gradual improvement of catastrophe insurance in China. The data used in the analysis was collected from the latest statistics in 2022 and came from a variety of sources, including books, public information of the Bureau of Statistics, government publications, policy documents, media reports (Xinhua News Agency, expert interviews), insurance company yearbooks, and data analysis collected by world scholars.

Green finance is a new thing that appears with the development of economy and society in recent years, and has gradually become a hot research object in all walks of life. As an important part of green

finance, green insurance plays an increasingly important role in national economic and social development, especially in dealing with environmental pollution and climate change, ensuring the normal operation of social economy, solving social risks and other aspects of unique advantages. As an important part of finance, insurance has the functions of risk management, credit raising and investment promotion, [30] which is conducive to promoting the development of green finance.

Insurance is a professional industry to discover, operate, manage and share risks.[31] Insurance can not only provide risk compensation and risk management, but also provide credit enhancement and financing.[32] We should actively promote green, low-carbon and sustainable global development and build a community with a shared future for mankind. As an important part of the green finance system, green insurance covers all the business of providing risk protection and investment for green industry projects. It is widely used to promote the development of green finance and green ecology in China.

Coping with natural disasters is a challenge facing the community of shared future for mankind. At present, China's economic development lacks the driving force and faces many social problems.[33] As one of the important factors restricting China's sustainable economic development, natural disasters are particularly complicated and prominent at this stage. The establishment of catastrophe insurance system is undoubtedly a worldwide problem. On the basis of learning from the successful experience of other countries, we should adjust the path of development in light of China's actual conditions. The development of catastrophe insurance integrates the environment, society and governance, and follows the development concept of ESG. At the same time, as a part of green insurance, it helps the development of green insurance, green finance and green economy.

Acknowledgements

This article was funded by the China Scholarship Council (No.202009010026)

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