Climate Change, Catastrophe Risk and Government Responsibilities

Qihao He, University of Connecticut School of Law
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[Abstract]
Due to climate change and an increasing concentration of the world’s population in vulnerable areas, how to manage catastrophe risk efficiently and cover disaster losses fairly is still a universal dilemma. Under the current political-economy configuration of “socialism with Chinese characteristics” which creates the so-called “Chinese miracle”, China’s mechanism for managing catastrophic disaster risk is in many ways unique. These mechanisms are collectively called the “Whole-Nation System” which emphasizes government responsibilities and works well in many aspects.

Nonetheless, the “Whole-Nation System” which has the vestige of centrally-planned economy needs reform. After assessing the challenges and problems of the “Whole-Nation System”, I start a broader discussion about government responsibilities for developing catastrophe insurance in China and may provide insights for other transitional nations. I propose a catastrophe insurance market-enhancing framework which marries the merits of both the market and government to manage catastrophe risks. There are three pillars of the framework: (i) sustaining a strong and capable government; (ii) government enhancement of the market, neither supplanting nor retarding it; (iii) legalizing the relationship between government and market to prevent government from infringing well-functioning market operations. Furthermore, three principles are introduced to facilitate government intervention in catastrophe insurance market, in order to shed light on solving this universal dilemma.

[Key words]
Catastrophe Risk, Government Responsibility, Catastrophe Insurance, Transitional China

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Insurance is something we tend to think about only after a disaster.¹

I. Introduction

Due to climate-related extremes, growing population in high-risk areas, aging infrastructure but low levels of public and private investment in risk reduction measures, the world is more vulnerable to catastrophe disasters and the losses are increasing significantly.² How to manage catastrophe risk efficiently and cover disaster losses fairly is still a universal dilemma.

“How famine happens every three years, epidemic happens every six years, and natural hazard happens every twelve years.”³ This old saying is a perfect description of the natural disasters in China. Due to China’s unusual size and regional diversity, as well as to its distinctive history and current political-economy configuration of “socialism with Chinese characteristics”⁴, its approach to handle disaster challenges is in many ways unique.⁵ The Chinese mechanism for managing catastrophe risks or challenges is known as the “Whole-Nation System” (“Juguo tizhi”), which generally refers to the government’s effort to deploy and allocate the whole nation’s resources to fulfill a specific difficult task within limited time, and thus promote the nation’s interest.⁶ The “Whole-Nation System” is not only a mechanism for coping with CAT disaster risks, but also is a much larger political ideology for dealing with all kinds of catastrophic challenges. Besides catastrophe disaster relief, Lunar Exploration Program and Olympic Gold Medals Strategy are also famous examples.

In the field of natural disaster, the “Whole-Nation System” is a kind of emergency-driven management system and focuses on disaster emergency relief. While effective in delivering governmental relief in short-run, it is hardly sustainable in long-run due to inevitable government failures. Nonetheless, comparing it with possible alternatives is still illuminating and may provide important insights for its reform.

Insurance is traditionally regarded as a main mechanism to cover losses caused by disasters. Though underwriting catastrophe insurance encounters market failures because of both supply-side and demand-side barriers,⁷ it is still an attractive tool to deal with catastrophe risk, especially compared with government intervention due to its advantages of lower transaction costs,

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¹ Adam F. Scales, Nation of Policyholders: Governmental and Market Failure in Flood Insurance, 26 Miss. C. L. Rev. 3 (2006-2007).
² Michel-Kerjan, E. Have We Entered an Ever-Growing Cycle on Government Disaster Relief, Presentation to U.S. Senate Committee on Small Business and Entrepreneurship (2013).
⁴ “Socialism with Chinese characteristics” is a grand but marvelously vague expression. It is first raised by reformist politician Deng Xiaoping in 1984, which stretches the acceptable ideological framework to allow the country to pursue policies that worked. See Vogel, Ezra F. Deng Xiaoping and the Transformation of China 465, (2011).
⁵ Perry, Elizabeth J. Growing Pains: Challenges for a Rising China, Daedalus 143, no. 2, 5-13 (2014).
lower adverse selection, and more efficiency as a result of competitive markets.\(^8\)

In this article, I try to assess the Chinese government’s responsibilities under the “Whole-Nation System”, highlighting what is unique or unusual (for better or worse) in efforts to resolve the universal dilemma of catastrophe risks. Furthermore, I will discuss the Chinese government’s responsibilities for embracing and developing catastrophe insurance (although cognizant of some market failures), and then propose a catastrophe insurance market-enhancing framework which marries the merits of both private market and public government to address the universal dilemma of natural disasters.

II. Natural Disasters and Their Impacts in China

A. Overview

China routinely suffers some of the most severe natural catastrophes in the world. Floods, droughts, earthquakes, typhoons and landslides/mudslides are the five most frequently occurring types.\(^9\) Floods hit the eastern part of China almost every year and drought is perhaps the severest natural disaster for agriculture, especially for North China.\(^10\) Historical records show that from 206 BC to 1936 AD, there have been 1037 floods and 1035 droughts; over this period, there has been an average of 0.967 floods or droughts per year.\(^11\) Typhoons affect the coastal areas in the southeast, much as hurricanes do in the US. Earthquakes occur in the western and northern areas. For example, the Great Sichuan Earthquake struck the southwest and caused 69,277 deaths and around $100 billion losses in 2008.\(^12\) Since the founding of the People’s Republic of China (PRC) in 1949, a “hazard cycle”, which describes the phenomenon that a catastrophic disaster occurs every 3 years on average, has clearly existed based on data calculations.\(^13\) As early as in 1920s, as a matter of fact, Mallory described China bluntly as a “Land of Famine”.\(^14\)

B. Climate Change Leads to More Catastrophes

Climate change is occurring on a significant scale and its effects are occurring on all

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\(^12\) Hu Jintao, *Address on the National Earthquake Relief Summary Commendation Conference* [Zai Quanguo Kangzhen Jiuzai Zongjie Biaozhang Dahui Shangde Jianghua], People’s Publishing House (2008).


\(^14\) Walter H. Mallory, China: Land of Famine (1926).
continents and across the oceans. It is demonstrated that there is a clear link between climate change and many extreme weather-related catastrophes: “[A] changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events”.

The impact of climate change for China has closely followed the global trend. The range of warming and the affected areas are great. It is estimated that by 2020, the national average surface temperature could increase by 1.7°C, by 2030 2.2°C and by 2050 2.8°C. The affected areas of climate warming extend from south to north.

The adverse consequences of climate change will be severe for China. More droughts will occur, the drought-prone area will continue to expand, and droughts will grow more intense. Except for the increased rainfall in the western part of the northwest, the north and southern part of northeast could become permanently dry. Meanwhile, floods, heavy rainfall, and landslides are likely to increase dramatically. The increasing frequency and intensity of catastrophe disasters will no doubt aggravate the vulnerability of the socio-economic development of China.

C. Losses Caused by Catastrophic Disasters

Besides climate change, which makes the occurrences of extreme weather disasters more frequent, China has the largest population in the world and most of it lives in South China and East China which are vulnerable to floods, typhoons, landslides/mudslides and earthquakes. Furthermore, China has become a booming economy—the second biggest in the world in 2009, with a per capital GDP of US $6,100 in 2012. For example, the Pearl River Delta, a densely populated metropolitan area comprised of Hong Kong, Guangzhou and Shenzhen, is situated in one of the world’s most disaster-prone regions. Floods and typhoons there put more people at risk than in any other metropolitan area in the world.

As a consequence, the economic losses and the population affected by catastrophes are

19 Based on the regression analysis of natural disaster occurrence and average global temperature from 1980 to 2010, the frequency of epidemics, extreme temperature, floods and storms was estimated to increase by 506 times per year if the average global temperature increases by 1°C. See Pan XB et al, Natural disaster occurrence and average global temperature, Disaster Adv 4:61–63 (2011).  
increasing significantly, and causing much greater socioeconomic impacts, especially during the last decade (2003-2012). Relative to the period 1900–2012, China experienced the highest frequency of natural disasters during the last decade (2003-2012), accounting for 37.6% of total occurrences. Last decade also saw 55.5% of the economic losses and was responsible for 52.4% of the affected population. (Table 1) Almost the same time, data also shows that the occurrences of major natural disasters are quite frequent and losses caused by catastrophes have mounted during 2004-2010 (Table 2).

<table>
<thead>
<tr>
<th>Disasters</th>
<th>Occurrences</th>
<th>Deaths</th>
<th>Affected population</th>
<th>Direct economic losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>25.0</td>
<td>0.0</td>
<td>31.2</td>
<td>28.4</td>
</tr>
<tr>
<td>Earthquake</td>
<td>34.1</td>
<td>10.4</td>
<td>76.0</td>
<td>92.2</td>
</tr>
<tr>
<td>Flooding</td>
<td>53.0</td>
<td>0.1</td>
<td>35.6</td>
<td>38.8</td>
</tr>
<tr>
<td>Landslide</td>
<td>41.8</td>
<td>54.0</td>
<td>96.3</td>
<td>48.5</td>
</tr>
<tr>
<td>Local storm</td>
<td>39.0</td>
<td>18.6</td>
<td>19.8</td>
<td>68.7</td>
</tr>
<tr>
<td>Tropical cyclone</td>
<td>32.5</td>
<td>1.3</td>
<td>55.8</td>
<td>56.3</td>
</tr>
<tr>
<td>Average</td>
<td>37.6</td>
<td>14.1</td>
<td>52.4</td>
<td>55.5</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Disasters</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
<th>LOSS (bn S$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>28</td>
<td>86.79</td>
</tr>
<tr>
<td>Flood</td>
<td>9</td>
<td>11</td>
<td>20</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>71</td>
<td>35.29</td>
</tr>
<tr>
<td>Storm</td>
<td>7</td>
<td>14</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>60</td>
<td>26.37</td>
</tr>
<tr>
<td>Drought</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>6.74</td>
</tr>
<tr>
<td>Extreme temp.</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>21.10</td>
</tr>
</tbody>
</table>


Table 1 Natural disasters of 2003-2012 in China, relative to the period 1900–2012, in per cent.23

Table 2 Occurrences of major natural disasters in China, 2004–2010.24

III. The “Whole-Nation System” and How It Works in China

The state has traditionally played the major role in risk-covering and disaster relief in China.25 After launching the project of “reform and opening” (gaige kaifang) in 1978, the disaster prevention, reduction, and relief mechanisms—collectively known as the “Whole-Nation

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“Whole-Nation System”—have been gradually established.26

Contrary to federal disaster policy of U.S., which began and continues as an individualist and anti-statist nation,27 the “Whole-Nation System” is not the result of the market failure of catastrophe insurance market, but the child of China’s history, economy and socialism political system. Before asking the question of what the content of the “Whole-Nation System” is and how it works, it is necessary to track the history of China’s disaster policy.

A. Historical Review of the “ Whole-Nation System”: the Transformation of Disaster Risk Management Since 1949

Natural disaster management has been a highly-sensitively issue for thousands of years in China. For example, building dams to prevent floods and protect agricultural production was routinely regarded as a major function of the centralized government in ancient times.28 Disaster management was also stipulated by law and regulations. For example, “Records of Laws and Systems of Qing Dynasty” (“Da Qing Hui Dian Shi Li” 1899) listed twelve articles on “Disaster Defense and Reduction Policies.”29

Since the founding of the People’s Republic of China in 1949, disaster risk management policy has passed through two phases. Socialist government and a centrally-planned economy were key features of the post-revolutionary order, and had great influence on disaster policy in the first phase. The dawn of the Third Plenum of the Eleventh Party Congress in 1978 brought an entirely new set of socioeconomic reforms, including disaster risk management reform.

1. Phase I: A Central Planned State (1949-1978)

This period saw the setting up of centrally planned disaster policies, accompanied by the shutting down of private insurance markets. During this period, people had no opportunity to buy insurance to cover their catastrophe exposures. The centrally planned economic system, not the mere existence of market failures, is responsible for the disappearance of private insurance. According to the requirements of socialist planned governance—at least in theory30—there is no need for business insurance because the government would bear all risks and cover individuals’ exposures.

27 Seymour Martin Lipset, American Exceptionalism: A Double-Edged Sword, 20 (1996). But see Moss, David A. When All Else Fails: Government as the Ultimate Risk Manager (2004) (arguing that though American has a strong tradition of individualism, also has a (contradictory) strain of relying on government for help “when all else fails”).
29 The Articles include but not limited to the following: food supply, river control and levee building, eradication of locusts, information dissemination and so on. See Chen, H. Disaster Defense and Reduction Policies in the Qing Dynasty [Qingdai fangzai Jianzai De Zhengce Yue Cuoshi], Studies in Qing History [Qingshi Yanjiu], no.3, 41-52 (2004).
30 According to the view of Karl Marx “from each according to his ability, to each according to his need”, with the full development of socialism, there will be enough to satisfy everyone's needs. See Karl Marx, Critique of the Gotha Program (1875), available at https://www.marxists.org/archive/marx/works/1875/gotha/ch01.htm.
Meanwhile, central government promulgated Regulation on the Organization of National Disaster Relief Commission [Zhongyang Jiuzai Weiyuanhui Zuzhi Jianze], which stipulated disaster policy as “self-rescue of victims, mutual support within social networks, and necessary assistance by government relief”. Self-rescue of victims means citizens are expected to take care of themselves in time of disaster. Mutual support within social networks means people should help each other among the local community. Although government purports to cover individuals’ exposures, government lacks the capacity to compensate disaster victims. China was one of the poorest nations at that time. Even in 1978, the per capita income was only $154, less than one-third of the average in Sub-Saharan African countries. Worse still, political leaders prioritized the development of large, heavy, advanced industries as they started building the nation, but paid less attention to natural disaster relief.

2. Phase II: Reform and Transition (since 1978)

Along with the transformation from a centrally-planned to a market-oriented economy, the disaster policy also underwent significant changes. The most significant feature of this period is the dramatically increased government intervention and expansion of disaster relief.

Right now, relief and reconstruction work after earthquakes, floods, typhoons and other disasters is mostly financed by the government, along with social donations through Red Cross and other charity NGOs. Unlike government’s actions in Phase I, the Chinese government has put the protection of people’s lives and property on the top of its agenda, and has given a prominent position for natural disaster risk relief in its economic and social development plans. The comparison between the Tangshan Earthquake (1976) in Phase I and great Sichuan Earthquake (2008) in Phase II clearly shows the expansion of government relief, and its changing priorities for disaster relief. Back in 1976, the Tangshan Earthquake, magnitude 7.5, killed 242,769 people. Central and local governments put 4.3 billion (RMB) into aid for disaster relief. In an effort to save face and assert its independence, the Chinese government refused offers of disaster aid and assistance from foreign countries and international organizations. In 2008, the great Sichuan Earthquake, magnitude 8.0, caused 69,277 deaths. In contrast, central and local governments put 128.7 billion (RMB) into disaster relief, a 30-fold increase. Furthermore, the attitude to foreign assistance has been totally reversed. Only two days after the earthquake, the Chinese government formally requested support from the international community and in total considering inflation (5.92% per year), there is still a 5-fold increase).

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38 Wenying Tong, Comparative Study on Catastrophe Disaster Relief Mobilization Mode in China: Case study between Tangshan Earthquake and Sichun Earthquake, Jianghai Academic Journal, vol. 5 (2010) (Even considering inflation (5.92% per year), there is still a 5-fold increase).
received $500 million to help the families affected by the earthquake.\(^{39}\)

The most convincing explanation for this change relates to China’s miraculous success in economic growth since 1978 when China launched the project of “reform and opening”. With GDP growing at an average of 9.8 percent per year, and international trade growing by 16.6 percent annually over the past 33 years, China is now an upper middle-income country, and more than 600 million people have escaped poverty.\(^{40}\) Per capital GDP reached $6,100 in 2012.\(^{41}\) With China’s success in raising personal incomes, and individuals’ relative risk aversion increasing with wealth, protection against the loss of existing income apparently emerged as an increasingly significantly social objective.\(^{42}\) When government began to obtain sufficient resources for disaster relief, disaster risk management became an important item on the nation’s policy agenda.

To date, China has established natural disaster risk management mechanisms featuring the role of government, rather than private insurance market.\(^{43}\) These mechanisms are collectively named as the “Whole-Nation System” (“Juguo tizhi”).

## B. The Content of the “Whole-Nation System”

### 1. Origin

The phrase “Whole-Nation System” actually borrows from China’s Soviet-style sports system.\(^{44}\) The “Whole-Nation System” was formed and promoted along with Chinese participation in the Olympic Games. It has taken China from no gold medals to the top of the tally—in 2008 Beijing Olympic Games, China won 51 gold medals while the US’ 36 and Russia’s 23—quenching the thirst of many Chinese for national pride.\(^{45}\) Olympic competition is one example of the “Whole-Nation System” working effectively in achieving a challenging objective in a short time.

The 1998 Yangtze River flood and 2003 SARS (Severe Acute Respiratory Syndromes) have been regarded as watershed events for the development of the “Whole-Nation System”. In 2007, the Emergency Response Law was promulgated. This law comprehensively stipulates emergency response plans, institutions, mechanisms and legal systems, and emphases the dominant role of government in emergency response of natural disasters.\(^{46}\)

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\(^{40}\) Naughton, Barry, *China’s Economy: Complacency, Crisis & the Challenge of Reform*, Daedalus 143, No. 2: 14-25 (2014).


\(^{44}\) Under this system, the government seeks talented young children from across the country, and the nation’s sporting resources are concentrated on those who aim to become world champions. See LIANG Xiao—long, *The Whole-nation System: The Successful Road of the Chinese Athletic Sports*, Journal of Guangzhou Physical Education Institute, vol. 26, pp 1-6 (2006).


2. Operating Agencies

The “Whole-Nation System” is under the unified leadership of State Council (the Central People’s Government). The central government is responsible for the coordination and organization of catastrophic disaster risk management. At the national level, the system is headed by the National Committee for Disaster Reduction (NCDR) which consists of 33 disaster related member agencies. (Figure 1) A vice premier of the State Council serves as the director of NCDR, and the Minister of Civil Affairs acts as its secretariat. A board of experts serves as consultants for the NCDR. For specific disasters, the corresponding ministries or bureaus are responsible for governance and technical affairs. For example, the China Earthquake Administration takes charge of governance in the case of earthquakes, and the Ministry of Water Resources takes charge of governance in the case of floods and droughts. These coordinating bodies not only provide decision-making services for NCDR on disaster response and relief, but also implement NCDR’s decisions. At the local level, corresponding organizations in accordance with the national level are also established.

3. Systematic Arrangements

For a transition state as China, its legitimacy not only depends on its economic performance, but also its response and accountability to the people. During the transition process, the Chinese government has come to prioritize disaster relief in its agenda. Since the early 1980s, China has promulgated more than 30 laws and regulations concerning disaster prevention, reduction and relief. These laws and regulations cover different aspects of disaster risk management.

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51 Lazarev, Y. A., A. S. Sobolev, I. V. Soboleva, and B. Sokolov, Trial by Fire: A Natural Disaster's Impact on Support for the Authorities in Rural Russia, World Politics 66, no. 4 (2014). (“The impact of natural disasters on support for authorities is conditional on governmental performance during and after the shock.”)
Besides laws and regulations, China government has also announced several national strategic plans relating to disaster risk management. A recent example is in 2007, the Chinese government issued the National Plans for Comprehensive Disaster Reduction in the 11th Five-year Plan Period.\(^{54}\) Although it is difficult to evaluate how well these laws, regulations and plans are implemented, at least they reflect the government’s concern for this issue. They stand for government’s willingness and efforts to prioritize disaster risk management on its agenda.

Under the “Whole-Nation System”, the government occupies the dominant position. In practice, government intervention can be classified into pre-disaster and post-disaster arrangements.

- **Pre-disaster arrangements**
  These include conducting natural disaster risk investigation and zoning, establishing natural disaster monitoring system and early warning system, pushing forward natural disaster prevention projects, establishing National Comprehensive Disaster Reduction Demonstration Communities, inspiring people’s attention to disaster prevention through designating May 12 as national Disaster Prevention and Reduction Day, and so on.\(^{55}\)

- **Post-disaster arrangements**
  These include mobilizing national sources to deal with natural disaster, coordinating government and NGOs to implement disaster relief, organizing counterpart-aid (duikou zhiyuan) to help disaster-affected areas, implementing reconstruction plan and so on.\(^{56}\)

Government fiscal support serves as the major capital source for disaster relief and post-disaster reconstruction.\(^{57}\) Government disaster relief can be categorized into three layers under the “Whole-Nation System”.

- **Emergency response**
  It includes rescuing victims, providing medical treatment to injured people, providing food and shelter for victims, engaging in water purification, sanitation, quarantine and epidemic prevention, and restoring transportation and other infrastructure for public interest.

- **Direct payment to victims**

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53 Ming Zou & Yi Yuan, *China's Comprehensive Disaster Reduction*, Int. J. Disaster Risk Sci. 1 (1): 24-32 (2010). For example, *Flood Control Law* was promulgated in 1997 and revised in 2009, which is enacted to prevent and control flood, to take precautions against and alleviate calamities by flood and waterlogging, and to maintain the safety of people's lives and property. The *Law of the People's Republic of China on Protecting Against and Mitigating Earthquake Disasters* came into force as of March 1, 1998 and revised in 2009, which is supposed to protect against and mitigate earthquake disasters, and ensure the safety of people's lives and property.


It includes a three-month temporary living subsidy to disaster-affected people, compensation to victim’s families, compensation to the injured, orphans, the elderly and the handicapped, and subsidies to help farm workers reconstruct their houses.

- Counterpart aid and reconstruction support
  These include rebuilding houses for victims, long-term grants and loans to resume commercial structures and businesses, and aiding the agricultural sector.

In short, unified leadership by the government is the foremost principle of the “Whole-Nation System”. It is a disaster management system where government mobilizes, deploys, and allocates the nation’s resources to cope with catastrophes, compensate victims, conduct reconstruction, and thus promote the welfare of victims and the nation’s interests. These interests extend beyond coping with a given disaster, but promoting the government’s image and fostering good relations between the various levels of government and the people.

C. How the “Whole-Nation System” Works in Practice—a Case Study of the 2008 Great Sichuan Earthquake

The 2008 great Sichuan Earthquake has shown how this system worked. In 2008, the Earthquake, magnitude 8.0, struck the Sichuan Province and caused 69,277 deaths. The losses are exceeding $100 billion. The “Whole-Nation System” played an essential role in coping with this catastrophic earthquake. According to three surveys conducted after the earthquake, government relief and recovery process are viewed as successful by the public, particularly in the immediate aftermath of the earthquake. The response of the government to the earthquake is regarded as both “close and timely”:

“[M]ost damage caused by the earthquake was quickly repaired… households were able to resume economic activities relatively quickly, and . . . education and healthcare systems continued to function under extraordinarily difficult circumstances, and resumed normal operations well before the end of the recovery period. In material terms, the recovery process did succeed in ‘building back better’ by providing new and improved public facilities, houses and infrastructure”.

1. Undertaking Disaster Relief and Compensating Victims

During the transition from a planned economy to a market economy in 1979, China has grown to be the second largest economy in the world, and its government has gained the unique ability to
undertake disaster relief. After 1995, social resources available to the government, particularly for the central government, grew enormously, due to both overall economic development and fiscal reform. Tax revenues as a share of GDP illustrate this dramatic change. (Figure 2) Considering the rapid growth of GDP itself, real budgetary revenues were almost twenty times in 2012 what they had been in 1995. In 2012, Chinese government revenues at $1.86 trillion are about equal to the U.S. federal government on-budget revenues, which are estimated by the Congressional Budget office at $1.97 trillion (excluding social security).

![Figure 2: China's Budget Share in GDP, 1978-2012](image)

**Figure 2** China’s Budget Share in GDP, 1978-2012

Thanks to its economic power, government has the ability to play a facilitating role in disaster relief. In the immediate aftermath of the great Sichuan Earthquake, which occurred on May 12, the central government appropriated $83 million to victims that evening; within one week, the central government supplied more than $400 million in earthquake relief. Within four months, the government had created an emergency disaster relief fund in the amount of about $11 billion, while the losses of the earthquake are around $100 billion. On September 23, 2008, the State Council announced a “Notice on the State Council Overall Planning for Post-Great Sichuan

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64 Budget revenues increased from 10.8 percent of GDP in 1995 to 22.6 percent of GDP in 2012, and the annual GDP growth average 9.8 percent over the period. See Naughton, Barry, *China's Economy: Complacency, Crisis & the Challenge of Reform*, Daedalus 143. No. 2: 14-25 (2014).


Earthquake Restoration and Reconstruction” (hereinafter “the Plan”). According to the Plan, more than $157 billion was to be allocated for restoration work in the 51 disaster-affected counties in the provinces of Sichuan, Gansu and Shaanxi.69

Direct payment to victims from government disaster relief funds is an important feature of the “Whole-Nation System”. Disaster relief funds were spent on victims mainly in the following ways. First, the funds were used to supply a three-month temporary living subsidy to earthquake-affected people. From 20th May, this subsidy was about RMB 10 plus 0.5 kilogram of grain product every day, to those affected people who had no residence and no income.70 Second, the fund supplied compensation to victims’ family. The number of fatalities was more than 70,000, and government provided each victim’s family with RMB 5,000.71 Third, it compensated the injured, orphans, lonely elderly and the handicapped (RMB600 per month). The government launched a special mechanism to mobilize 375 hospitals from 20 provinces to treat more than 10,000 seriously injured, providing RMB 28,000 medical subsidies for each injured person. For those with minor wounds, around 374,000 people, their medical treatment was free of charge.72 Fourth, it supplied subsidies to help farmers reconstruct their houses. In early June, the State Council decided that it would pay an average of RMB10,000 per household to farmers whose houses collapsed or were severely damaged or who became homeless in the earthquake affected region including Sichuan, Gansu and Shaanxi Provinces for the purpose of reconstructing their houses.73

Three years after the earthquake, when the recovery and reconstruction period outlined in the Plan were over, the surveys of victims showed that most households’ living conditions had indeed recovered to pre-earthquake levels or better.74 For example, housing and employment goals, as the first two objectives of the Plan, have been largely fulfilled. Almost everyone in the earthquake-affected area lived in a permanent house, with only 0.6 percent of households still living in temporary houses or tents.75 Employment rate was indeed relatively high, with the unemployment rate at only 2%, and household income increased considerably as well.76

2. Mobilizing Military Power for Emergency Disasters Relief

The Chinese People's Liberation Army (hereinafter PLA) has a long history of involvement in

disaster relief, and constitutes an integral part of the “Whole-Nation System”. Due to the central government’s mobilization and its command-and-control structure, the PLA made significant contributions to the operation of the “Whole-Nation System”, especially in the emergency response to disasters.

Contrast to the U.S. where deploying military power to domestic disaster relief has been a subject of controversy, and the voice of “where’s the Cavalry” in failed response to Hurricane Katrina involves this inherent tension. PLA is warmly welcomed and hardly receives criticisms in domestic disaster relief. In addition, in recent years, the mounting frequency of and losses from natural catastrophes has placed increased demands on the military to be deployed to domestic disaster relief under its powers to conduct “military operations other than war.” China, as a developing country, lacks sufficient civilian emergency management capacity compared with western countries, and thus the military has been a powerful and energetic integral part of the “Whole-Nation System”. In 2005, the State Council and the Central Military Commission jointly promulgated Regulation on the Army’s Participation in Disaster Rescue which designated the PLA as the “shock force” in national responses to catastrophic disasters.

The PLA contributes significantly to the efficiency of the “Whole-Nation System” in disaster emergency response and relief. First, the military responded with unprecedented speed to the earthquake, and made the best use of the golden hours of disaster rescue to save as many as lives as possible. Only 13 minutes after the earthquake, the PLA activated the military plan for handling emergency incidents; Within 10 hours, 12,000 PLA and PAP (People’s Armed Police) soldiers arrived and undertook earthquake rescue; and on the next day, another 11,420 troops arrived by air transportation alone. Second, civilian government made use of the military’s vertical command-and-control structure to improve relief efficiency under the circumstance of catastrophic impacts and losses. Within the PLA, a three-tiered command system was quickly set up to oversee the military’s relief operation, and these ad hoc institutions were also subject to the leadership of the civilian government at the corresponding level. Third, the military undertook wide-ranging relief activities counting on its huge numbers of troops. The PLA is the largest army in the world, and it could quickly mobilize a large number of soldiers to handle disasters, as it has throughout the PRC’s history. (Table 3) 146,000 troops were deployed, and they evacuated around 1.4 million people, provided medical treatment to 1.36 million injured people, and rescued 3,338 people. Furthermore, they also restored road transportation, provided food and shelter for victims, engaged in water purification, sanitation, quarantine and epidemic prevention, etc.

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82 Chen, W, Zhiqiu! Xinshi qizi kai de ren [Pay tribute to the most beloved people in the new period], Dangshi Yanjiu [Journal of Party History], 8:1 (2008).
Even though the majority of PLA troops withdrew within three months of the earthquake, some engineering units stayed for another three months to assist with post-earthquake reconstruction.86

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>PLA and PAP Troops</th>
<th>Reserve and Militia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Major flooding of the Yangtze, Songhua, and Nen Rivers</td>
<td>300,000</td>
<td>5,000,000</td>
</tr>
<tr>
<td>2002</td>
<td>Flooding in Shanxi, Fujian, and 19 other provinces</td>
<td>20,000</td>
<td>170,000</td>
</tr>
<tr>
<td>2003</td>
<td>Flooding of the Huai River in Jiangxi, Hunan, and Shanxi provinces</td>
<td>48,000</td>
<td>410,000</td>
</tr>
<tr>
<td>2008</td>
<td>Snow and ice storms in 21 provinces</td>
<td>224,000</td>
<td>1,036,000</td>
</tr>
<tr>
<td>2008</td>
<td>Earthquake in Wenquan, Sichuan</td>
<td>146,000</td>
<td>75,000</td>
</tr>
<tr>
<td>2008</td>
<td>Security for the Olympics</td>
<td>131,000</td>
<td>na</td>
</tr>
<tr>
<td>2010</td>
<td>Earthquake in Yushu, Sichuan</td>
<td>16,000</td>
<td>na</td>
</tr>
<tr>
<td>2010</td>
<td>Mudslides in Zhouqu, Gansu</td>
<td>7,600</td>
<td>na</td>
</tr>
</tbody>
</table>

Table 3 Numbers of Soldiers that Participated in Major Disaster Relief Since 199887

3. Counterpart Aid (Duikou Zhiyuan): National “Pooling” of Catastrophe Risk among Inter-governments

Pooling is a fundamental mechanism in both public risk management and private insurance. Its basic principle lies in combining and spreading a sufficient number of exposures across a group as large as possible.88 “Counterpart aid” (duikou zhiyuan) is a mechanism that, under the central government’s organization, requires some provinces which have stronger economic power, to assist and support the reconstruction of disaster-affected areas.89 It is generally conducted on a one-to-one basis, under the principle of “one province helps one significantly affected county”.90 The match criterion set up by the central government is that the richest donor provinces will contribute to the hardest-hit victim areas, while the less wealthy provinces will be asked to do less, and the least wealthy provinces will not be assigned victim areas. According to the “Notice on the State Council Overall Planning for Post-Great Sichuan Earthquake Restoration and Reconstruction (2008)”, 18 heavily affected counties in Sichuan Province, were supported by 18 other provinces or municipalities. For example, Guangdong Province—the richest province measured by GDP—was responsible for the reconstruction of Wenchuan County which was the epicenter of the Earthquake and suffered the severest losses. Shandong Province—the second richest province in 2008—was responsible for and supported the reconstruction of BeiChuan

County, which was the neighbor of Wenchuan County and also heavily hit by earthquake. Meanwhile, Gansu province, Guizhou Province and other less wealthy provinces have no responsibility for counterpart aid.

Under the framework of counterpart aid, supporting provinces are required to spare 1% of their fiscal revenue in the preceding year to supported counties for reconstruction in the next three years. 1% is the minimum requirement of the central government, but the supporting province may increase the share at discretion. As a matter of fact, some provinces spare more than 1% share. (Table 4) Under the authoritarian regime, political benefit is an important incentive for the supporting provinces’ governors to increases the counterpart aid capital.

<table>
<thead>
<tr>
<th>Supporting Provinces or Municipalities</th>
<th>fiscal revenue in 2007 (billion RMB)</th>
<th>Required counterpart aid (1%) (billion RMB)</th>
<th>Supported counties</th>
<th>counterpart aid in 2008 (billion RMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guangdong</td>
<td>278.526</td>
<td>2.785</td>
<td>Wenchuan</td>
<td>4.162</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>223.666</td>
<td>2.236</td>
<td>Mianzhu</td>
<td>4.363</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>164.949</td>
<td>1.649</td>
<td>Qingchuan</td>
<td>3.499</td>
</tr>
<tr>
<td>Shanghai</td>
<td>207.448</td>
<td>2.074</td>
<td>Dujiangyan</td>
<td>6.198</td>
</tr>
<tr>
<td>Beijing</td>
<td>164.964</td>
<td>1.649</td>
<td>Shifang</td>
<td>5.306</td>
</tr>
<tr>
<td>Liaoning</td>
<td>108.199</td>
<td>1.081</td>
<td>Anxian</td>
<td>2.6</td>
</tr>
<tr>
<td>Fujian</td>
<td>70.03</td>
<td>0.703</td>
<td>Pengzhou</td>
<td>3.318</td>
</tr>
<tr>
<td>Anhui</td>
<td>54.347</td>
<td>0.534</td>
<td>Songpan</td>
<td>1.889</td>
</tr>
</tbody>
</table>

Table 4 Performance of Some Supporting Provinces in Counterpart Aid in Sichuan Earthquake

In short, counterpart aid, to some extent, can be regarded as a special “pooling” of catastrophe risk, because it spreads specific natural disaster risk across the whole nation and improves the social welfare. This mechanism differs from the central fund which would require every province to give 1% into a central fund that can then be used across victimized areas. Counterpart aid linking donor and recipient areas in this way seems economically pointless since it only imposes unneeded constraints on the flow of funds. However, due to China’s unusual size and regional diversity, especially the huge economic gap among different provinces—for example, the GDP of the richest province in 2014 is 77 multiples of the poorest—requiring the richer provinces to contribute more in disaster relief emphasizes the concern of equality rather than the economic efficiency.


92 Under China’s authoritarian regime, the political selection of officers depends on a competitive political tournament. Therefore, the governors of provinces have incentives to perform better in counterpart aid to attract the attention of central government. See Zhou, Lian, Xizheng Fabaozhi [Administrative Subcontract], Shehui [Society], No.6, 1-38(2014).

93 Hua, Zhongdong, Duikou Zhiyu China Jiben Gonggong Fawu Zhundenghua Xiaoying Fensif [The Effects Analysis of Counterpart Support to the Equalization of Basic Public Services-- Taking Earthquake-Stricken Areas of Sichuan as a Case], Xi’an Caijing Xueyuan Xuebao [Journal of Xi’an University of Finance and Economics], No. 5, 75-81, (2010).

4. People Rely on and Trust in Government

Given the history of a planned economy, people still have a strong reliance on government, especially in the aftermath of a catastrophe. According to a nationwide survey which covered 856 different cities and counties in 2009, when asked “Who should take the major responsibility to undertake the burden of disaster losses and pay the bill?,” nearly 70% of respondents indicated that government should take the major responsibility and cover disaster losses, while only 6.6% believed community or individual families should be responsible. Under the leadership of the government, the “Whole-Nation system” accords with preferences for relying on government to deal with catastrophes.

The successful practices of the “Whole-Nation System” not only requires a proactive government, but also needs people’s trust in that government. Only if the government enjoys high levels of trust can it gain space and freedom to act and have the opportunity to prove that its actions are in the interests of the people. A lack of trust would undermine credibility and stability of the “Whole-Nation System”, and lead to inefficiency, unrest, or even failure. In 2005, a study of trust in China found that the general level of trust in the Chinese government was high. Three surveys conducted after the great Sichuan Earthquake also found that the levels of trust in government were generally high in the earthquake-affected areas. For example, in 2008, 98% of respondents indicated that they trusted central government (in 2009, 98%, in 2011, 97%, respectively).

Why do Chinese government and the “Whole-Nation system” enjoy such high trust? The reasons may illustrate as follows. First, under the authoritarian regime, natural disasters provide unique opportunities for government to show its responsibility and accountability to the people. Therefore, government has strong incentives to perform well and increase people’s loyalty through the “Whole-Nation system”. Second, unlike the federal system of the U.S., China is a unitary state, in which the central government has absolute impact on the performance of the local governments. During disaster relief, local governments are not only supported but also supervised by the central government. It guaranteed that the “Whole-Nation system”, especially counterpart aid, worked well. Third, people in earthquake-affected areas have heard of how the “Whole-Nation System” worked in past disasters. Take the 1998 Yangzhi Flood for example, in which most of the victims were bailed out by the government.

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96 Delhey, Jan, & Kenneth Newton, Social trust: global pattern or Nordic exceptionalism? Discussion paper for Wissenschaftszentrum Berlin für Sozialforschung (WZB) (2004).
98 Dalen, K., Trust and distrust— a study of trust and social and personal capital in context of China and Denmark, Master at the Institute of Comparative Politics at the University of Bergen (2005).
100 Lazarev, Y. A., A. S. Sobolev, I. V. Soboleva, and B. Sokolov, Trial by Fire: A Natural Disaster's Impact on Support for the Authorities in Rural Russia, World Politics 66, no. 4 (2014). (The legitimacy of government depends on not only its economic performance, but also its response and accountability to the people. The impact of natural disasters on support for authorities is conditional on governmental performance during and after the shock.)
5. A Short Conclusion

Having reviewed how the “Whole-Nation System” works in dealing with catastrophes, it appears the China’s government has done a reasonable job, at least in the immediate aftermath of a disaster. It has unique resources and manages the disaster response and recovery processes. It coordinates multiple levels of government and establishes national pools. It also mobilizes the military for emergency response to disasters. The result is that the “Whole-Nation System” has engendered widespread popular trust. Though by no means a perfect risk manager, the Chinese government does take up the vacuum, as Nobel economist Kenneth Arrow suggested in another context, to “undertake insurance in those cases where [a private market for insurance], for whatever reason, has failed to emerge.”

D. The Problems of the “Whole-Nation System”

Now we are ready to ask whether the “Whole-Nation System” can possibly do any better than private insurance which has already demonstrated significant market failures in covering catastrophe risk. As will become clear, the answer is a resounding “yes” in theory, but only a tantalizing “no” in reality. As a matter of fact, government is by no means a perfect risk manager. Just as even the best market systems confront “market failures,” government solutions confront many obstacles and problems, collectively known as “government failures.” The “Whole-Nation System” is no exception.

According to surveys conducted after the 2008 Great Sichuan Earthquake, indicated that the degree of satisfaction with all levels of government (except the central government) had declined since the quake.103 (Figure 3) The criticism of government relief grew over time. 104

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Along with the investigation of how it works during the 2008 Great Sichuan Earthquake, the “Whole-Nation System” exposes many problems, especially over the long run. These include, but are not limited to, the following:

- The perverse incentives for rent-seeking and corruption;
- Samaritan’s Dilemma reducing people’s incentives to invest in protection and mitigation measures;
- The regressive effects of counterpart aid;
- The lack of risk financing under the “Whole-Nation System”;
- The burden on public budgets possible drags on economic growth;
- The over-use of the military’s resources for non-defense purposes.

1. Corruption Problems

Before the economic reform and opening, corruption tended to be visible and easy to prevent, because officials normally had only a single income source under the planned economy. However, corruption problems became more serious and rampant when China decided to transit from a planned to a market economy. While the government remains as powerful as it had always been, the market-oriented reforms create substantially greater rent-seeking opportunities. As a

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107 China’s economy transition process is known as “dual-track system” which differs from “shock therapy.” Dual-track system refers to the process of moving from a single track, planned economy system to a combination system and finally to the single track of a market system. Under the dual-track system, market prices of goods during the transition are obviously higher than the planned prices, because planned prices are artificially suppressed by the government. Furthermore, government regulates market access to placate “legacy” suppliers. These market distortions too often lead to rent-seeking and corruption. See Lin, Justin Yifu, Demystifying the Chinese economy, Cambridge University Press 194-198 (2012).
result, officials at every level have found many sources to receive incomes beyond a single government salary. Officials who implement the “Whole-Nation System” are not easily immunized from corruption problems. As a matter of fact, increasing government aid under the “Whole-Nation System” may create more corruption opportunities.

There were several different forms of local officials’ corruption in the wake of the 2008 Great Sichuan earthquake. A first form of corruption is the embezzlement or misuse of relief funds. The central government sent funds to various agencies in Sichuan province after the earthquake. Although that money was intended for relief, significant amounts of it ended up paying for government banquets and officials’ bonuses. Other example of the embezzlement of relief funds is that a secondary school built in 2010 was later torn down to make way for luxury houses with quake relief funds. A second form of corruption is the misappropriation or misuse of disaster goods. In Deyang city, which was affected by earthquake, an officer secreted 10 containers of earthquake relief goods rather than send them to homeless residents. Furthermore, some tents marked "disaster only" had appeared in some officers’ upscale patios barely touched by the quake. A third form of corruption occurred when officials secretly granted reconstruction projects to their friends or family members, without due process or transparency. According to the earthquake relief audit report of National Audit Office of PRC, there had been 146 of these cases in Sichuan in 2008, totaling $220 million.

Unfortunately, corruption problems are much worse in the long-run under the “Whole-Nation System”. The relief and reconstruction funds from the central government were allocated to local governments, and local governments were requested to take responsibility for implementation. In early days after the disaster, almost all government relief programs were under the spotlight of the whole nation: not only the central government but also the media. In these circumstances, it was difficult for the local officials to divert disaster aid. But as time passed and the "media spotlight" shifted, national attention was diluted. As a result, although the total accumulated capital for disaster relief was quite high, the central government leaders' focus on the disaster was short lived. Public attention to disasters is in line with the media coverage. As we all know, media coverage surges upward in the immediate aftermath of a disaster, throwing a bright

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108 For example, officials have the power to grant permits for a variety of businesses such as land acquisitions or construction. They may ask for direct payments, but also share in the company, property at below market price, lavish dinners and others. Such practices are so widespread, and so many officials and their family members are involved, those corruption problems are extremely difficult to solve. See Vogel, Ezra F, Deng Xiaoping and the Transformation of China 712 (2011).


115 Moss, D. The Peculiar Politics of American Disaster Policy: How Television has Changed Federal Relief, in The Irrational Economist, (Erwann Michel-Kerjan and Paul Slovic (eds.), 151-160) (2010). For example, then-premier Wen Jiabao arrived at the affected areas to command disaster relief just 8 hours after the 2008 Sichuan earthquake. However, after less than a month, he had to go back to Beijing to deal with other national affairs, and paid less and less attention to earthquake relief after the emergency work was accomplished. See Wen Jiabao: Please Remember the Great Sichuan Earthquake (China News, May 24, 2008), available at http://www.chinanews.com/gn/news/2008/05-24/1260997.shtml.
spotlight on the victims, and then quickly dissipates. This short time horizon weakens public and media supervision of local government disaster relief work. And when local officers were the only ones who knew what was going on, they may succumb to temptation to abuse their power and exploit the victims.

This problem is not specific to China. Any system involving distributing large sums of money is vulnerable to dishonest contractors and corrupt officials. As every government learns after disasters, "money corrupts."

2. Samaritan’s Dilemma

The "Samaritan’s Dilemma" (based on an old parable of the traveler from Samaria who helped a stranger whom he found beaten and robbed by the side of the road) haunts governmental aid. According to James Buchanan’s definition, the Samaritan’s Dilemma is created when the government makes direct payments to individuals after a disaster, giving them incentives not to take protection measures or purchase insurance, but instead to rely on government to bail them out. Even if the government promises ex ante not to provide such relief, the promise is not credible, because it will be in everyone’s interests to offer such relief after a disaster has struck. Therefore, more government bailouts may cause more disaster losses because people are less likely to take precaution measures.

The “Whole-Nation System” faces the Samaritan’s Dilemma. Often, a government bailout is motivated by an admirable humanitarian impulse which spurs redistributing wealth to those who have suffered loss from those who have escaped. Political concerns are also important under the “Whole-Nation System”. Though the Chinese central government has no re-election constraints, governmental performance in providing relief during and after the disaster impacts the support for the authorities at all levels. However, this humanitarian and political action ignores the fact that in some cases, the effect of the redistribution will encourage future loss-causing activities that would not otherwise be undertaken. Some pure forms of government bailout, including ad hoc direct payment and compensation funds, provide insufficient incentives for risk prevention and loss mitigation. Therefore, individuals will be less inclined to protect against disaster when they believe government will bail them out, which increases the magnitude of loss of the whole nation.

In addition, the Chinese people have historically had a strong desire to rely on governmental bailout in the wake of a catastrophe. Under the “Whole-Nation System”, the government is committed to restoring social and economic order after a disaster. Thanks to such a governmental commitment, individuals’ personal experiences and media reports of past catastrophes, it is perfectly rational for the Chinese people not to take adequate protective measures. Many residents admit that they are exposed to catastrophe risks, but they seldom transfer risks through insurance because they believe government will bail them out when catastrophes happen.\footnote{He Wang, \textit{Research on Catastrophe Risk Insurance Mechanisms}, China Financial Publishing House 5(2013).} According to an empirical study on property and causality insurance in five Chinese provinces, there is a negative correlation between the amount of government relief and residents’ investment in prevention measures such as purchasing insurance.\footnote{Tian, L. and Zhang, Y., \textit{Influence Factors of Catastrophe Insurance Demand in China—Panel Analysis in a Case of Insurance Premium Income of Five Provinces} [Woguo Juzai Baoxian Xuqiu Yingxiang Yinsu Shizheng Yanjiu: Jiyu Wusheng Bufen Baofei Shouru Mianban Yanjiu], Wuhan University of Technology (Social Science Edition) [Wuhan Ligong Daxue Xuebao (Shehui Kexue Ban)], vol. 26, no. 2, 175-179(2013).}

In short, the Samaritan’s Dilemma, which reduces individuals’ incentives to invest in protection measures and leads to further government bailouts, is a challenge for the “Whole-Nation System”.\footnote{James M. Buchanan, ‘The Samaritan's Dilemma’, in: Altruism, morality and economic theory. In: E.S. Phelps (ed.), New York: Russel Sage foundation 71-85 (1972).}

3. The Regressive Effects of Counterpart Aid

Counterpart aid is a mechanism within the “Whole-Nation System” under which the central government organizes a special “pooling” of catastrophe risk across the country. It relies on the maxim that “one province helps one significantly affected county,” requiring the richer provinces—not all provinces—to help disaster-affected areas and contribute more in disaster relief. However, when the disaster is a widespread catastrophe and many counties are affected, this “one province helps one significantly affected county” arrangement frequently leads to the situation in which not-that-rich provinces have to help reconstruct richer (by per-capita fiscal expenditure) counties. For example, Hunan province was responsible for the construction of Lixian County after the Great Sichuan Earthquake. However, the per-capital fiscal expenditure of Hunan province was only 2,135 RMB in 2007, while 2,165 RMB in Sichuan province and 4,209 RMB in Lixian County.\footnote{Ni, Feng, Zhang, Yue, and Yu, Tongzhou, \textit{Wenchuan Dadizhen Duikou Zhiyuan Chubu Yanjiu} [Preliminary Research on Counterpart Aid of Wenchuan Earthquake], Jingji Guanli Yu Yanjiu [Research on Economics and Management], vol. 7, 55-62 (2009).} Similar cases happened in Jilin province, Anhui province and Jiangxi province. (Table 5) Counterpart aid aims to realize the goal of “common prosperity” through richer provinces helping poorer ones. In practice, however, sometimes poorer provinces have to help richer ones. Adding to the problem, there are no legal provisions regulating counterpart aid, which means the obligations of supporting province are unclear and arbitrary, and decided at the discretion of central government.\footnote{Zhao, L. and Jiang, Y.J., \textit{Analysis of Local Government Coordinated Assistance Modes}, [Difang Zhengfu Duikou Zhiyuan Moshi Fenxi], Journal of ChengDu University (Social Science Edition) [ChengDu Daxue Xuebao (Sheke Ban)], no.2, 4-7, 25(2009).}

<table>
<thead>
<tr>
<th>Supporting Provinces or</th>
<th>Per capital fiscal</th>
<th>Supported counties</th>
<th>Per capital fiscal</th>
</tr>
</thead>
</table>
### Municipalities expenditure in 2007 (RMB) | expenditure in 2007 (RMB)
--- | ---
Hunan | 2,135 | Lixian County | 4,209
Jilin | 3,237 | Heishui County | 4,149
Anhui | 2,033 | Songpan County | 4,107
Jiangxi | 2,072 | Xiaojin County | 3,056

| Table 5 Comparison between Some Supporting Provinces and Supported Counties in Per Capital Fiscal Expenditure before 2008 Earthquake (RMB) |

Sometimes, the counterpart aid arrangement has not followed the principle of equality or efficiency, but results from political pressure. For example, after Xinjiang Riot in 2009, one year later, nineteen provinces are required to supply counterpart aid to Xinjiang Uygur Autonomous Region (Hereinafter “Xinjiang”) for its reconstruction and development just like post-disaster restoration and reconstruction of Great Sichuan Earthquake. Actually, per capital GDP of some supporting provinces are lower than Xinjiang. Three years later, more supporting provinces, including Hunan province, Henan province and Shanxi province, were still lower than Xinjiang in per capita GDP. From this perspective, the “Whole-Nation System” lacks the features of an equality arrangement, and the regressive effects of counterpart aid are more severe.

Even when poor areas suffer from catastrophe losses, unfairness may also arise. For example, after the 2008 Great Sichuan Earthquake, Shandong province, which ranked top three of GDP in 2007, was responsible for reconstruction of BeiChuan County and donated 12 billion RMB (about USD 2 billion). The per-capital fiscal expenditure of Shandong province is 2,415 RMB in 2007, while 2, 299 RMB in Beichuan County. Four years later after the counterpart aid, however, BeiChuan County is much better than a lot of counties of the Shandong Province. In 2012, per-capita fiscal expenditure of Shandong province was around 5,900 RMB, while about 8,000 RMB in Beichuan County.

As a matter of fact, counterpart aid does not eliminate risk, but only distributes the burden of disaster losses across the taxpayers of supporting provinces. Therefore, counterpart aid emerges as an arguably unfair arrangement for the residents of the supporting provinces, because the supporting provinces may treat its own residents “less favorably” than those in disaster areas. Under China’s political selection system in which the central government says the final word

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132 XIONG Wenzhao & TIAN Yan, Research on the Legalization of Partner Assistance Policy in Xinjiang [Duikou Yuanjiang Zhengce De Fazhihua Yanjiu], Journal of Xinjiang Normal University (Social Science) [Xinjiang Shifan Daxue Xuebao, Shehui Kexue Ban], vol. 31, No. 3, 2010.
133 Per capital GDP of Jiang Xi province (21288 RMB), An Hui province (20002 RMB) are lower than Xinjiang (23159 RMB). See XIONG Wenzhao & TIAN Yan, Research on the Legalization of Partner Assistance Policy in Xinjiang [Duikou Yuanjiang Zhengce De Fazhihua Yanjiu], Journal of Xinjiang Normal University (Social Science) [Xinjiang Shifan Daxue Xuebao, Shehui Kexue Ban], vol. 31, No. 3, 2010.
134 Zhao, L. and Jiang, Y.J., Analysis of Local Government Coordinated Assistance Modes, [Difang Zhengfu Duikou Zhiyuan Moshi Fenxi], Journal of ChengDu University (Social Science Edition) [ChengDu Daxue Xuebao (Sheke Ban)], no.2, 4-7, 25(2009)
rather than the residents, governors of supporting provinces have strong incentives to deal with disaster-affected areas more favorably than their own residents, because the counterpart aid is politically favored by the central government.

4. Lack of Risk Financing

Risk financing is regarded as one of three pillars of risk management, and classically requires those who face risks to pay for coverage through risk-based premiums. Ex ante insurance with risk-based premiums provides incentives to accumulate reserves and mitigate losses before disasters, while ex post government aid may reduce incentives to reserve funds or carry out mitigation activities. However, the “Whole-Nation System” pays little attention to, and indeed, lacks the capacity of risk financing through ex ante insurance markets to compensate victims, instead of focusing on ex post relief. For the compensation of Great Sichuan Earthquake, only $300 million of the losses were covered by insurance companies, only 0.3 per cent of the total losses incurred.

Furthermore, the “Whole-Nation System”, such as counterpart aid, "crowds out" the establishment and development of risk financing markets through depressing the demand of individuals for catastrophe insurance. Individuals are less likely to purchase insurance to pre-finance their potential disaster losses. According to general international experiences, catastrophe insurance system is often established within two years after disaster occurs. For example, after 1942 earthquake in New Zealand, in 1944, an earthquake insurance system was established. California’s experience was similar. However, five years after the 2008 Great Sichuan earthquake, a catastrophe insurance market has not yet been officially established in China. The “Whole-Nation System” which played a powerful role in earthquake relief at least partially accounts for it.

5. Other Challenges and Problems

Besides the above problems of the “Whole-Nation System”, there are also some potential challenges. Disaster relief imposes burdens on public budgets and may drag on economic growth. In smaller and developing countries, a catastrophe event can result in higher public deficits and
debt.\textsuperscript{144} Though China is now the second largest country of economy in the world, the cost of the “Whole-Nation System” still imposes a considerable burden on public budget. For example, the government spent approximately $166 billion after the 2008 earthquake in restoration and reconstruction.\textsuperscript{145} Despite that, there is no consensus on whether disaster relief depresses or actually enhances economic growth.\textsuperscript{146} A two-period equilibrium model indicates that direct payment of disaster relief funds may depress rather than enhance economic growth, because disaster relief related to the loss of capital and the substitution effect of direct transfer payment depresses post-disaster labor supply.\textsuperscript{147} And such effects of disaster relief on growth have been tested using panel data on 31 Chinese provinces, municipalities and autonomous regions, over the period 2004-2010.\textsuperscript{148} In addition, the “Whole-Nation System” as the ad hoc compensation tool for victims leads to an unstable budget, which may dampen economic growth.

The extensive use of the military in disaster relief has been a double-edged sword, because it could potentially displace the development of an effective civilian-based disaster management system in the future.\textsuperscript{149}

The misappropriation of funds or goods also contributes to the negative impact of the “Whole-Nation System”. According to a survey report in earthquake-affected areas after 2008 Great Sichuan Earthquake, the Ministry of the Civil Affairs was in charge of medical aid money while Ministry of Health was responsible for patients’ treatment. This mismatch of rights and obligations between different departments increases transaction cost but also leads to the misuse of capital and medical sources.\textsuperscript{150}

\section*{E. A Short Conclusion}

After considering the discussion of the content of “Whole-Nation System” and how it works and its problems, we may see that the “Whole-Nation System” has indeed played a valuable role in dealing with catastrophe losses in China. More important insights for the “Whole-Nation System”, however, suggest opportunities for improvement. Figure 4 summarizes that its pre-disaster measures as \textit{ex-ante} mitigation actions are efficient policies to address catastrophe losses and its post-measures in emergency response are also efficient. Figure 4 also shows the problems of the “Whole-Nation System”. What the “Whole-Nation System” did in pre-disaster measures is too little, not too much. For actions post-disaster, it should closely examine the methods of victims’ compensation and counterpart aid.

The “Whole-Nation System”, in this limited context, seems to have performed reasonably well. But it is far from a totally efficient, sustainable, and long-term catastrophe risk management system.

\textsuperscript{144} Re, Swiss, \textit{Disaster risk financing: Reducing the burden on public budgets}, Swiss Re Focus Report (2008).


\textsuperscript{149} Jian Zhang, The military and disaster relief in China: trends, drivers and implications, in Disaster Relief in the Asia Pacific: Agency and Resilience (Minako Sakai, et al, eds. 2014)

system since it also confronts a lot of problems. Though private insurance must deal with various market failures in its covering of catastrophe risks, it is difficult to say the “Whole-Nation System” is superior to catastrophe insurance. In order to deal with the risk of natural disasters more effectively in China, there is an urgent need for the reform of the “Whole-Nation System” to integrate it with insurance that could finance underlying catastrophe risks and has other advantages, and could thus improve social welfare and move toward social justice.

Figure 4 Evaluation of the “Whole-Nation System”

IV. Government Responsibilities for Disasters: from the “Whole-Nation System” to Catastrophe Insurance

Having reviewed the performance of the “Whole-Nation System”—its achievements and problems—we are now ready to explore its reform and transition. Compared with the government-run “Whole-Nation System”, insurance is traditionally recognized as an important tool to deal with catastrophic disasters, “through risk pooling and risk shifting, but also risk
reduction and risk management”. Moreover, many law and economics scholars favor insurance as a private market mechanism for distributing catastrophe risk, especially when compared to government-provided compensation. For example, Jaffe and Russell, Kunreuther, Epstein, Priest, and Kaplow argue that insurance is better equipped to deal with catastrophe risks due to its advantages of lower transaction costs, lower adverse selection, and greater efficiency. Michel-Kerjan et al. provide a simplified view of different options that the state would typically choose: with the level of economic development improving, public and private catastrophe insurance system is gradually developing. (Figure 5) According to this simplified view, it seems that China should move from stage 2 to stage 3. It is consistent with our conclusion that catastrophe insurance could be a necessary and proper complement for the “Whole-Nation System”. Before the discussion of how to play insurance’s role in addressing catastrophe losses, however, the starting point should be how to create a catastrophe insurance market in China where it, for whatever reason, still has failed to emerge.

Figure 5 A Simplified View on Governments’ Responses to Financial Management of Natural

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Disasters

A. The Immature Catastrophe Insurance Market in China

In 1959, government closed all domestic insurance companies, and the insurance businesses as a whole virtually disappeared from 1959 to 1978. After the Third Plenum of the Eleventh Party Congress, the process of institutional transformation towards a market-oriented economy began, and commercial insurance agencies also resumed doing business. In 1979, The State Council approved the Notice on Restoration of the Domestic Insurance Business and Strengthening of the Insurance Agency which allowed insurers to underwrite property insurance, vehicle insurance, marine insurance and life insurance. Since 1989, the insurance industry has been one of the fastest growing industries in China, with nominal premium income growing at an annual average 30 percent. China’s insurance market ranked as the fourth largest in the world in 2013.

Catastrophe insurance, however, has walked a much bumpier road than other lines of insurance industry. In 1987, the Ministry of the Civil Affairs launched the agricultural insurance pilot projects in Heilongjiang Province, Fujian Province and Jiangsu Province. It is worth noting that these agricultural insurance policies covered catastrophic risks such as droughts and floods. However, these pilot projects were closed after 12 years experimentation. In 1996, floods, typhoons and other natural disasters were all prescribed as exclusions by regulators in property insurance policies. Thus, these catastrophic exposures were excluded from coverage under standard-form policies. As a result, it should be no surprise that in the 1998 Yangtze River flood, insurance covered only about 1.25 per cent of economic losses—$500 million coverage out of total loss of $40 billion. In 2000, China Insurance Regulatory Commission (CIRC)—the newly established insurance regulatory agency—required that without its permission, insurers were not allowed to underwrite earthquake insurance policies. As a result, only 0.3 per cent of

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161 Luo Guo—liang (2009), Process and Experiences: Disaster Mitigation of New China for Sixty years, Beijing Social Science, vol 5, 73-79.
the total losses were covered by insurance companies in the 2008 great Sichuan Earthquake.\textsuperscript{168} This Earthquake underscored the need for catastrophe insurance. In 2012, one of the main topics in the Fourth National Finance Working Conference was establishing a system of catastrophe insurance.\textsuperscript{169} In 2013, Regulation on Agriculture Insurance was promulgated, which included government-subsidized agricultural catastrophe insurance.\textsuperscript{170} For example, Article 8 provides that the central government should establish subsidized agricultural catastrophe insurance, and local governments are encouraged to follow and contribute to the pool; Article 17 prescribes that any insurance company that wants to underwrite an agricultural insurance policy must include catastrophe insurance arrangements. This Regulation includes a provision on catastrophe insurance; however, there are no details on how the government will establish the system, how much government will subsidize policyholders, how insurers should prepare for the catastrophe insurance arrangements, or many other technical questions. In 2014, catastrophe insurance program trials were begun in Shenzhen, in the Pearl River Delta (a densely populated metropolitan area and also one of the world’s most disaster-prone regions), and in the Chuxiong region in the southwestern province of Yunnan, which is prone to earthquakes.\textsuperscript{171} These pilot programs have yet to be evaluated. Overall, catastrophe insurance in China is still at a very immature stage and cannot yet meet the rising demand for disaster relief. It needs proper government intervention.

\textbf{B. Theoretical Framework for Developing Catastrophe Insurance Market: Overcoming the Market-Government Dichotomy and Looking for Customized Solutions}

Generally speaking, there are three major theoretic frameworks for analyzing government responsibilities in market intervention: laissez-faire theory, also called market-friendly view; public interest theory, also called developmental-state view; and market-enhancing theory.\textsuperscript{172} Like other areas of economy, how to develop an insurance industry generally falls into one of those three camps.


\textsuperscript{169} The National Finance Working Conference is supreme financial conference in China, which decides on the most important finance issues, such as establishing China Insurance Regulation Commission (CIRC), (2012), available at http://finance.ce.cn/sub/2011/jrgzhy.


\textsuperscript{171} Reuters, China says testing catastrophe insurance system (August 20, 2014), available at http://www.businessinsurance.com/article/20140820/NEWS04/140829990?AllowView=VD1UXkI13hDUFNCbKjYkVY1TDJaRU36ajBRV0FrOYfHYHUT099.

1. The Laissez-faire Theory

The laissez-faire theory of government policy believes that the efficient allocation of resources within the economy can be achieved through the market mechanism; even when markets alone are insufficient, other private-sector organizations will suffice, and the outcome still remain more efficient than government intervention.\(^\text{173}\) According to this theory, private insurance markets could achieve efficient market equilibrium, and government's role is limited to providing a fair legal environment for market transactions.\(^\text{174}\) In such an analysis, calling for government intervention in providing catastrophe insurance, would be viewed as opportunistic “rent-seeking” attempts of special interest groups to secure an *ex-ante* wealth transfer from taxpayers.\(^\text{175}\)

In many aspects, this theoretic framework has merits. In the absence of distortion-inducing government intervention, the outcome of private insurance market may remain more efficient. Take rate regulation of catastrophe insurance for example: government often suppresses insurance rates due to political pressure. As a result, the premium cannot reflect the real risk. Insurers can no longer cover the variable cost of providing insurance or recoup their initial investments in providing service, and this creates an availability crisis.\(^\text{176}\) The U.K’s private flood insurance scheme, developed about half a century ago, offers an example of how largely private markets could work.\(^\text{177}\) Private insurance performs as insurance companies compensate victims in the case of flood damage. Though the British government sets standards and rules for flood protection, land-use and flood warning, it promises to guarantee the independence of privately run compensation “schemes” according to a gentlemen’s agreement which defines the rights and duties of state and industry.\(^\text{178}\) The U.K private flood insurance scheme has remained largely unchanged ever since its emergence in 1961, and has proven to be efficient and sustainable.\(^\text{179}\)

However, the laissez-faire theory, in which government is considered as a black box usually unsuccessfully solving problems of markets, is largely inappropriate for dealing the practical problems of economic development and social reform in transition countries.\(^\text{180}\) It confronts the “paradox of the adjusting state”**: on the one hand, “the government is required to withdraw from interventions into economic activities and to perform a more passive role”; on the other hand, “economic transition and development usually require nimble and robust political authorities to implement and enforce the new market-oriented policy directives due to existing market

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imperfections”. Making the government more effective so that it can solve new challenges and perform new roles in facilitating private-sector coordination is of utmost importance for economic transformation and social reform. However, it is not explicitly included in the laissez-faire theoretic framework.

Catastrophe insurance started only recently in China. In the aftermath of the 2008 Great Sichuan earthquake, however, a catastrophe insurance market has still not yet been officially established. Only recently has the government decided to intervene: some pilot programs of catastrophe insurance in Shenzhen City and Ningbo City have been implemented since 2014.

Due to imperfections in the insurance market in China, explanations for catastrophe insurance not having been quickly established since the Great Sichuan Earthquake are easily perceived. From the supply side, insurers face a lot of obstacles to underwriting catastrophe insurance policies, such as lack of catastrophe data to identify, quantify and estimate the chance of disasters and to set premiums; relatively low capacity of insurance industry; limited access to international reinsurance and capital markets; regulatory obstacles and so forth. From the demand side, consumers do not always behave rationally and maximize their expected utility to protect themselves from catastrophe losses. Their demand for catastrophe insurance has also been blunted by expectations of a government bail-out. Therefore, following the guide of the laissez-faire theory would lead to the catastrophe insurance market not developing soon in China, let alone playing its potential role in mitigating and financing catastrophe losses.

2. The Public Interest Theory

The public interest theory of government policy contests the laissez-faire theory. It holds that government intervention targeted at addressing market failures (such as externalities, imperfect competition, moral hazard, adverse selection), and by solving the suboptimal allocation of resources, government intervention can improve social welfare. According to this theoretical framework, government intervention is often seen as a substitute for or complement to imperfect

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183 It is still not formally available, although there is coverage for some natural disasters in some property insurance policies underwritten by the People’s Insurance Company of China (PICC). According to general international experiences, catastrophe insurance system is often established within two years after catastrophe disaster. For example, after 1999 Marmara earthquake in Turkey, with the support of the World Bank and Turkey government, the Turkish Catastrophe Insurance Pool (TCIP) was created in 2000. See Johann-Adrian von Lucius, A Reinsurance Perspective on the Turkish Catastrophe Insurance Pool, in Catastrophe Risk and Reinsurance: A Country Risk Management Perspective 217-224 (Gurenko, Eugene N., ed., 2004); Jaffee, D. M., & Russell, T. Behavioral Models of Insurance: the Case of the California Earthquake Authority, University of California-Berkeley Working Paper (2000).
184 According to the latest news, in July 2014, the Government of Shenzhen City bought catastrophe insurance policy from PICC on behalf of residents of Shenzhen. This catastrophe insurance framework includes three different parts: the first part is the government catastrophe assistance insurance which is bought by the Shenzhen municipal government to supply the basic assistance for all residents, the second part is a catastrophe fund and the third part is private catastrophe insurance. See http://xw.sinoins.com/2014-07/10/content_120490.htm.
coordination in the private markets.\textsuperscript{186} Advocates consider government to have better information and judgment than private insurers and to be able to guide markets wisely.\textsuperscript{187} For developing countries where market failure is more pervasive, government intervention is called for more strongly. Limitations on insurance market infrastructure, lack of liquid capital markets, information asymmetries and other imperfections associated with the catastrophe insurance market necessitate the role of government in developing private market, according to supporters of public interest theory.\textsuperscript{188}

Even in the United States, where Americans have long believed the gospel of free markets and anti-statist logic, deep government intervention in the management of private sector risks is really nothing new.\textsuperscript{189} The government and private lenders want savers to feel confident in their banks and credit unions, so that the supply of saving and lending is maintained.\textsuperscript{190} As a result, the deposit insurance system and U.S. Federal Deposit Insurance Corporation was established, in order to prevent the type of mass banking panic that crippled the American financial system in the early 1930s, and protect depositors and maintain confidence in the banking system.\textsuperscript{191} The government and consumers want to ensure that an adequate level of farming activity continues even in face of potentially catastrophic weather risks, so that the nation is not excessively dependent on imported food.\textsuperscript{192} As a result, the Federal Crop Insurance Program (FCIP) which is administered by the Federal Crop Insurance Corporation (FCIC), within USDA’s Risk Management Agency was established.\textsuperscript{193} The government and employers want people to continue to live and work in certain geographic areas, e.g. the Borough of Manhattan in New York City and Silicon Valley of California where there are risks, though infrequent, of terrorist attacks, floods, hurricanes and earthquakes.\textsuperscript{194} As a result, the Terrorism Risk Insurance Act (TRIA) in November 2002 was passed and provided government reinsurance; National Flood Insurance Program (NFIP) was established and sponsored by government; the California Earthquake Authority (CEA) is also quasi-public.\textsuperscript{195} When private insurers have failed to emerge or withdrawn underwriting, in consideration of the public interest, government has chosen to secure continuing insurance markets.

Although market failure and the need for economies of scale are common justifications for the government to intervene in an insurance market, they are not alone sufficient.\textsuperscript{196} On the contrary,
a lot of public insurance programs have been shown to be inefficient. The U.S. National Flood Insurance Program is an example. Federal government is unlikely to implement general insurance underwriting principles, such as risk segregation, price discrimination to control adverse selection and the use of various mechanisms to control moral hazard, due to political pressures and lack of market experience.\footnote{Adam F. Scales, \textit{A NATION OF POLICYHOLDERS: GOVERNMENTAL AND MARKET FAILURE IN FLOOD INSURANCE}, 26 Miss. C. L. Rev. 3 (2006).} As a result, the non-risk-based-premiums tend to distort the market price signal and encourage policyholders to over-invest in risky areas and to take inadequate steps to mitigate losses.

In contrast with laissez-faire theory, public interest theory requires government to act as a substitute for coordination in the private markets. However, public interest theory is not suitable for China’s market-oriented transition and reform. Right now, China is still struggling through the transition from a centrally planned economy towards a market economy. No independent business sectors and free markets existed until 1978.\footnote{Wang, Feng & Haitao Yin, \textit{A New Form of Governance or the Reunion of the Government and Business Sector? A Case Analysis of the Collaborative Natural Disaster Insurance System in the Zhejiang Province of China}, International Public Management Journal 15(4), 429-453 (2013).} During the transition process, China adopted a gradual dual-track approach rather than shock therapy, and moved gradually to a well-functioning market economy.\footnote{Justin Yifu Lin, \textit{Demystifying the Chinese Economy}, The Australian Economic Review, vol. 46, no. 3, pp. 259–68 (2013).} The experience of the dual-track approach shows that the more energetic power is coming from private companies. They played a significant role in economic growth, not state-owned enterprises. The existence of state-owned enterprises is mainly due to the political consideration, in order to avoid the collapse of old-priority industries and preserve rents for those who may be negatively affected by the shift towards a market system. Nonetheless, dual-track approaches as the transitional arrangement can hardly serve as the permanent foundation for further development, and it needs to move from a dual track of planned economy and market economy to the single-track market economy.\footnote{Justin Yifu Lin, \textit{Demystifying the Chinese Economy}, The Australian Economic Review, vol. 46, no. 3, pp. 259–68 (2013).}

In addition, if China adopted public interest theory, the threat of a reunion of the government and the state-owned insurance enterprises may become reality and see the dual-track approach "back slide" to the single-track planned economy.\footnote{Wang, Feng & Haitao Yin, \textit{A New Form of Governance or the Reunion of the Government and Business Sector? A Case Analysis of the Collaborative Natural Disaster Insurance System in the Zhejiang Province of China}, International Public Management Journal 15(4), 429-453 (2013).} The case of collaborative rural house insurance system in the Zhejiang Province supplies a vivid example of such challenges. In this program, insurance products are primarily designed by the government and marketed through administrative mobilization instead of market channels run by PICC (Zhejiang Branch). This program was initiated in 2006. However, a well-functioning market for insurance has not been established, and adequate financial protection to residents against natural disaster losses is still lacking.\footnote{Wang, Feng & Haitao Yin, \textit{A New Form of Governance or the Reunion of the Government and Business Sector? A Case Analysis of the Collaborative Natural Disaster Insurance System in the Zhejiang Province of China}, International Public Management Journal 15(4), 429-453 (2013).}
3. The Market-Enhancing Theory

The Market-enhancing theory of government policy is different from both the laissez-faire theory and the public interest theory, and takes a middle position. It recognizes market failure leads to suboptimal allocations of resources, and thus suggests government can facilitate more efficient coordination in the private sector and enhances the development of the private market; it also suggests government should not substitute or replace the private sectors, and should especially avoid creating permanent new government institutions to substitute for private insurers. This theory was first applied into managing catastrophe disaster risk by Lewis and Murdock as early as 1990s. It has been widely discussed by scholars and international financial institutions, such as the World Bank.

Market-enhancing theory represents a new kind of government intervention that helps facilitate the creation of private markets and assists private insurers to solve market failures. In contrast to laissez-faire theory, this framework looks for the role of government in achieving more efficient market equilibrium. This is particularly true for transitional and developing countries where private institutions are more limited and presently unable to solve all market failures. In contrast to public interest theory—the traditional government intervention—it promotes the decentralized decision making of private insurers and avoids creating bureaucracy. In other words, the provisions of catastrophe insurance policies should be left to private insurers. This is particularly important for transitional countries where, under the impact of a planned economy, government is still powerful and might be tempted to meddle in "micro-management" of insurance activities. As is well known, the establishment of efficient catastrophe insurance programs depends on the integration of four key components: risk assessment, risk pooling, risk segregation, and control of moral hazard. Government should create a legal environment to enhance private transactions, rather than get involved in the details of setting premiums and underwriting policies.

This theoretic framework has many merits. It helps establish an effective and sustainable catastrophe risk financing system with collaboration between government and private insurers.

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Government avoids acting as a direct insurer, but it can act as a reinsurer or lender of last resort when private underwritings are unavailable or inadequate. More importantly, this theoretic framework encourages public-private partnership which could help facilitate access to international reinsurance and capital markets to generate affordable products for domestic insurers. In practice, this market-enhancing theoretical framework has already attracted the attention of international financial institutions, like the World Bank which guides government intervention in catastrophe risk markets of low- and middle-income countries. In 2000, the Turkish Catastrophe Insurance Pool (TCIP) was established with the assistance of the World Bank in the aftermath of the Marmara earthquake. The TCIP is managed by a board of seven members; insurance companies cede 100% of all risk to the pool; the adjustment of claims is done by independent loss adjustors; and the full risk capital requirements of TCIP are funded through commercial reinsurance, including Milli Re and Munich Re. The TCIP sold more than 4.8 million policies set at market based premium rates in 2012, compared to 600,000 covered households when the pool was set up, and penetration rate rose to 29 percent nationwide. A similar catastrophe pool is being developed in Romania, and there are now even multiple-country regional organizations, such as the Caribbean Catastrophe Risk Insurance Facility.

Like many other areas of the economy, the developing catastrophe insurance market in China can draw lessons from the accumulated achievements of the ongoing socioeconomic reforms—the so-called “Chinese miracle.” What a coincidence! The essence of China’s “miracle” is consistent with market-enhancing theory, rather than laissez-faire theory or public interest theory. The Chinese approach stresses the fundamental role of the market in resource allocation but also expects the government to play a facilitating role by addressing externalities, coordination and many other market failure issues.

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217 Perry, Elizabeth J. Growing Pains: Challenges for a Rising China, Daedalus 143, no. 2, 5-13 (2014).
218 Simply speaking, the main experiences of China’s “miracle” development are: (i) well-functioning competitive markets, which is the precondition for developing a country’s industries because only with such a market can prices reflect scarcities of production in the economy and propel firms to enter industries; (ii) a proactive, facilitating government, which is equally important because for transitional countries, the government should seize and capture the advantages of late comers through playing a role in information collection, coordination and compensation for externalities. See Justin Yifu Lin, Demystifying the Chinese Economy; The Australian Economic Review, vol. 46, no. 3, pp. 259–68 (2013).
219 The Chinese approach strives to institute a new hybrid system, which, indeed, is the market-enhancing approach. China does not follow the shock therapy—policy recommendation based on orthodox economic theory—promoting economic liberalization and privatization, which is more or less the application of laissez-faire theory. The failure of Russian’s transition, a typical example of shock therapy, however, reveals that liberalization-cum-privatization approach does not automatically bring about efficient and sustainable market structures. China’s success and Russia’s failure proved that maybe for developed countries, the government should interfere less; but for transition countries, a minimum government is not optimal. On the other hand, a strong,
Considering the low-probability but high-consequence nature of catastrophe risk, the currently immature condition of the insurance market and economic development experiences, the market-enhancing theory could be the proper guiding theory to develop a catastrophe insurance market in China. In addition, market-enhancing theory conforms to the practice of catastrophe insurance pilot programs in China. Market-enhancing theory emphasizes the importance of local information, and suggests the decentralized private agents can use locally available information to come up with market-based solutions that are significantly more efficient than those that could be imposed by a central authority.\textsuperscript{220}

Nonetheless, potential challenges should be closely examined when applying the market-enhancing theory in China. China has not transitioned into a market economy despite decades of reform. Thus, government may easily slide into intervening in micro business activities in the name of public interest, due to path dependency.\textsuperscript{221} The case of Collaborative Rural House Insurance System which mainly covers the losses caused by natural disasters in the Zhejiang Province of China is a reflection of how the government and the insurance company work with each other in a way similar to how they would operate in a planned economy.\textsuperscript{222} This is so, even though the provisions of The Notice of Developing Rural House Insurance (2006) require that the operations of the market should follow the principles: (i) insurance companies operate based on market mechanisms and (ii) government promotes insurance coverage through subsidization.\textsuperscript{223} Legislation states clearly that the insurance company, rather than the government, should be the primary operator as an independent market entity. In fact, however, the government intervenes in an all-encompassing manner and there are no incentives for insurance companies to market products; additionally, since only PPIC P&C is allowed to participate in such business, this company does free-ride on government efforts and enjoy monopolistic benefits.\textsuperscript{224} As a result, a well-functioning and effective rural house insurance market is far from being established so far.


4. A Short Conclusion

By examining laissez-faire theory, public interest theory and market-enhancing theory, I suggest that market-enhancing theory might be a proper theoretical guide for the development of catastrophe insurance market in China. As Ronald Coase said, “satisfactory views on policy can only come from a patient study of how, in practice, the market, firms, and governments handle the problem of harmful effects”. Such study indicates that devising a catastrophe insurance market systems and enhancing insurance’s role in addressing catastrophe losses becomes an urgent challenge.

C. Principles for Government Intervention in Catastrophe Insurance Market

Based on the above analysis of the market-enhancing theory and the experiences of China’s transitional development, I try to propose a catastrophe insurance market-enhancing framework, to coordinate the role of government and market in catastrophe risk management in China. The content of this framework has three pillars:

- Sustaining a strong and capable government;
- Enhancing the market, neither supplanting nor retarding it;
- Legalizing the relationship between government and market to prevent government from infringing well-functioning market operations.

In order to efficiently apply the catastrophe insurance market-enhancing framework, and help establish a well-functioning catastrophe insurance market and disaster compensation system, I further propose three principles to facilitate government intervention in catastrophe insurance market:

- Principle 1. Government should help solve market failures in catastrophe insurance and secure insurers’ business operations using market mechanisms, rather than creating new government institutions to substitute or supplant private solutions.
- Principle 2. Government may establish a mandatory catastrophe insurance system through legislation, and help solve the affordability problem at the same time.
- Principle 3. Government should reform the “Whole-Nation System” to avoid crowding out private insurance and enhance the collaboration between the insurance industry and government.

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1. Government Responsibilities under Principle 1

Due to insurability limits with catastrophe risk and the high potential losses of catastrophe exposures, insurers lack the capacity and appetite to sufficiently cover all such losses.

a. Helping Insurers Fulfill the Insurability Requirements

Insurability of catastrophe risk is an important consideration for insurers when they decide whether or not to underwrite policies. If the risk is not insurable, insurers will have no appetite, even if they have financial capacity to write more business. Generally speaking, there are two agreed-upon requirements for insurability: (i) the insurer must have the ability to identify, quantify and estimate the chances of disasters and the resulting losses; (ii) the insurer must have the ability to set and collect appropriate premiums for catastrophe risks. To help fulfill the insurability requirements, governments can assist insurers with risk assessment, mapping risk zones, information flows, and et al.

Risk assessment is used to discover the underlying actuarial costs of catastrophe risk, and help set accurate risk-adjusted premiums. It requires data collection, catastrophe risk modelling and other technical support. Government, for example, has the advantages in data collection of natural disasters due to its disaster relief experiences. Mapping risk zones, as a matter of fact, can be regarded as a way of risk assessment, because it depicts and summarizes specific hazard risks of properties or zones. It could be best conducted through collaboration between governments and insurers. For example, European countries were required to prepare flood hazard and flood risk maps before 2014 in order to abide by the 2007 European Flood Risk Management Directive.

Insurance businesses are heavily dependent on information flows, which include information flowing from policyholder to intermediaries, from intermediaries to insurers, and from insurers to reinsurers. If information cannot flow smoothly and correctly, it will not only increase transaction costs but make it difficult for insurers/reinsurers to identify, quantify and correctly estimate the chances of disasters and the resulting losses.

b. Increasing the Capacity of Insurance Industry

Due to the highly correlated and aggregation nature of natural disasters, the potential losses of

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catastrophe risks are large and uncertain. China’s insurers may still lack sufficient financial capacity to fully cover catastrophe losses. Indeed, the total capital of China’s property insurance companies is much lower than the total amount of losses caused by natural disasters. (Table 6)

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<th>2007</th>
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<td>9.0</td>
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<td>Natural Disaster losses</td>
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<td>189.5</td>
<td>40.1</td>
<td>86.1</td>
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Table 6 Capital of Main Chinese Property Insurers Compared to Natural Disaster Losses

As early as 1992 Hurricane Andrew, insurers have known that outside capital was needed to supplement the industry’s capacity. Government could enhance the “marriage” between insurance markets and capital markets with measures like proper deregulation and tax exemptions. This is particularly important for the Chinese government, because its insurance/reinsurance market and capital markets are still in their infancy. In order to make the “marriage” work, government has the duty to facilitate its development by eliminating market barriers, reducing transaction costs, establishing rule-of-law market, and more.

In addition, government may act as the reinsurer to help increase the capacity of insurance industry. Indeed, effective and sustainable catastrophe risk financing solutions require collaboration between government and private insurers, especially in the case of extreme catastrophes when the private reinsurance market "hardens." The design of government as reinsurer may learn from the well-functioning Turkish Catastrophe Insurance Pool (TCIP). When earthquake losses exceed $80 million, the excess losses will be transferred to reinsurance market. Turkish government covers “losses that would exceed the overall claims paying capacity of the TCIP, which is currently sufficient to withstand a 1-in-350 year earthquake”. TCIP is supported by the World Bank which provided financial and technical assistance. As the first national catastrophe insurance pool in World Bank client countries, TCIP serves a good model for China.

Besides acting as a reinsurer of last resort to increase the capacity of insurance industry, Lewis

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235 For example, in France and Japan, where catastrophe coverage is mandatory, all catastrophe insurance policies written by private insurers are reinsured by the government-run reinsurance company, which essentially serves as guarantor for all policies written. In the U.S., according to the requirement of Terrorism Risk Insurance Act (TRIA) in November 2002, the federal government agreed to provide a kind of reinsurance “backstop” for terrorism losses. See Nektarios, Milton, A Catastrophe Insurance System for the European Union, Asia-Pacific Journal of Risk and Insurance, Vol. 5: Iss. 2, Article 6 (2011); Thomas Russell, & Jeffrey E. Thomas, Government Support for Terrorism Insurance, 15 Conn. Ins. L.J. 183 (2008).
and Murdock also proposed that government may sell industry-level excess-of-loss contracts for insured disaster losses as a last resort. Furthermore, government funds or government guarantees could also be alternative considerations.

c. Promoting Risk Classification and Encouraging Risk-based Premiums

Risk classification and risk-based premiums are the heart and lungs for healthy insurance business. Only by segregating policyholders into different risk pools, can insurers charge different premiums for different pools; can reduce adverse selection; can incentivize risk reduction by policyholders, and thus make profits. However, government and government-run catastrophe insurance systems are unlikely to implement this basic principle when faced with political pressures, because risk classification is not always compatible with social solidarity objectives which promote equal treatment of all citizens. Therefore, government should neither create new institutions to supplant private solutions nor suppress premiums of insurance policies, but should allow insurers to set the premiums to reflect risks. Even if there are concerns about the affordability of catastrophe insurance, it is better to take measures from the perspective of consumer demand (such as insurance vouchers which I will discuss in section below) than to suppress insurers’ incentives to underwrite policies and distort risk signals provided by actuarily-based premiums. As a Chinese proverb has it, “you can’t expect the horse to run fast when you don’t let it graze.” Government can’t expect the insurers to underwrite policyholders’ risks while don’t let them make profits.

d. Encouraging Disaster Mitigation Activities

Disaster mitigation activities can benefit both the policyholders and insurers, because it decreases costs of catastrophe insurance system in the long run. Catastrophe insurance systems in different countries encourage mitigation activities. Government should encourage disaster mitigation policies which include but are not limited to conducting natural disaster risk investigation and zoning; establishing natural disaster monitoring systems and early warning systems; implementing building code standards; pushing forward natural disaster prevention

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239 “It is designed to complement existing private-sector insurance and reinsurance mechanisms by covering only layers of reinsurance currently unavailable in the private market”. See Lewis, C. M. & K. C. Murdock, Alternative Means of Redistributing Catastrophic Risk in a National Risk Management System, In The Financing of Catastrophe Risk 80 (Froot, K. eds., 1999).
projects; investing in public protection infrastructure and et al.245

2. Government Responsibilities under Principle 2

a. Establishing Mandatory Catastrophe Insurance System

Probably one of the most debated issues in establishing catastrophe insurance systems is whether or not they should be mandatory. Compared with private insurers, government or lawmakers have power to compel consumers to participate in insurance programs, no matter whether they are government-run or private-run insurance.246 Opponents and proponents both propose a lot of arguments to justify their propositions.247 Generally speaking, the potential challenges associated with the mandatory catastrophe insurance system include (i) violating contract freedom, (ii) cross-subsidization, and (iii) anti-competition. In contrast, the potential benefits generally include (i) correcting irrational behaviors to justify violating contract freedom, (ii) managing adverse selection to justify cross-subsidization, (iii) enhancing national solidarity to justify anti-competition, and (iv) promoting damage mitigations. Though there are several (potential) challenges of mandatory insurance system, advantages often justify these challenges.

More importantly, due to low-probability nature of catastrophe risks and reliance on government bail-out under the “Whole-Nations System”, Chinese consumers have quite weak incentives to purchase catastrophe insurance products. In addition, consumers everywhere do not always behave rationally and maximize their expected utility to protect themselves from catastrophe losses by buying insurance. Myopic loss aversion shows that prior to a disaster, consumers believe that natural disasters will not happen to them.


247 A summary literature overview of the debate is as follows: Kunreuther proposed a mandatory model as early as 1968. This opinion was repeated by some other scholars, especially after Hurricane Katrina, and also received support from European scholars. See Howard Kunreuther, The Case for Comprehensive Disaster Insurance, 11 J.L. & Econ. 133 (1968); Howard Kunreuther, Has the Time Come for Comprehensive Natural Disaster Insurance?, in On Risk and Disaster: Lessons from Hurricane Katrina 175, 175 (Ronald Daniels, Donald F. Kettl & Howard Kunreuther eds., 2006); Howard Kunreuther & Mark Pauly, Rules rather Than Discretion: Lessons From Hurricane Katrina, 33 J. Risk & Uncertainty 101, 102-04 (2006); Telesetsy, A, Insurance as a Mitigation Mechanism: Managing International Greenhouse Gas Emissions through Nationwide Mandatory Climate Change Catastrophe Insurance, 27 Pace Envtl. L. Rev. 691 (2010). European scholarship includes: Reimund Schwarze & Gert G. Wagner, In the Aftermath of Dresden: New Directions in German Flood Insurance, 29 Geneva Papers on Risk & Ins. 154, 163 (2004); Faure, M. G. Insurability of Damage Caused by Climate Change: A Commentary, 155 U. Pa. L. Rev. 1875 (2007); Michael Faure & Veronique Bruggeman, Catastrophic Risks and First-Party Insurance, 15 Conn. Ins. L.J. 1 (2008). On the other hand, some literature indicates the potential dangers to mandatory insurance system, such as regulatory paternalism, anti-competition, overgeneralization and etc. See Anthony I. Ogos, Regulatory Paternalism: When Is It Justified?, in Corporate Governance in Context: Corporations, States, and Markets in Europe, Japan and the U.S. at 303, 303-20 (Klaus J. Hopf et al. eds., 2005); Scott E. Harrington, Rethinking Disaster Policy, 23 Regulation 40 (2000).

Of course, it should be noted that mandatory insurance systems require legislation because many consumers would opt out if there were no clear legal obligations. In addition, government should not create new institutions to run; but encourage private insurers to sell insurance policies and process claims, using their established processes, since they will be more cost-effective.

**b. Solving the Affordability Problem**

When deciding to establish a mandatory catastrophe insurance system, there is an obvious tension between a high risk-based premium and affordability, given the severity and spatial correlation of catastrophe losses. The pricing debate over the National Flood Insurance Program (NFIP) in the United States is a vivid example of this tension: on March 21, 2014, President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 which responded to political complaints of "unaffordability" by repealing and softening certain provisions of the Biggert-Waters Flood Insurance Reform Act of 2012 that moved toward premiums reflecting risk. As a developing country, the affordability problem is even tougher in China.

Government may provide basic coverage for residents. The basic coverage of catastrophe losses as part of social safety net programs could be justified because the public social insurance is insufficient in China. However, it should be implemented via *ex ante* catastrophe insurance, rather than compensating victims directly via the *ex post* “Whole-Nation System”. The “Whole-Nation System” as the administrative financial delivery systems faces severe problems of many types. From this perspective, outsourcing coverage via purchasing insurance may be more efficient.

Ideally, coverage of catastrophe losses can be regarded as an integrated system consisting of different layers. Government coverage is just the first layer and the remaining layers supplied by private insurers can cover broader exposures. In this instance, to solve the affordability problem of poor people, government could supply insurance vouchers rather than traditional direct-premium subsidies to insurance buyers. Direct-premium subsidies that depress premiums “tend to have highly distortional implications for the insurance markets and risk management behavior of the policyholders”.

The U.S. Crop Insurance Program and India’s National Agricultural Insurance

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254 Direct-premium subsidy is often an arrangement where 50% of the risk-based premium is paid by the policyholders and the rest may be paid by government. See Cummins,J. D. & O. Mahul, Catastrophe Risk Financing in Developing Countries: Principles for Public Intervention, World Bank Publications 82-83 (2009).
Relief and the Crowding out of Flood Insurance

Journal of Extreme Events, 01, 1450001 (2014).

Journal of Risk Research: An International Quarterly 75(3):

Insurance and Mitigation Practice, vol. 39,

Kunreuther, Howard & Michel Post

Journal of Extreme Events, 01, 1450001 (2014); Kunreuther, Howard & Michel

Kousky, Carolyn, & Howard Kunreuther, Catastrophe Risk Financing in Developing Countries: Principles for Public Intervention, World Bank Publications 82-83 (2009).


Raschky, Paul A., Reimund Schwarze, Manijeh Schwindt, and Ferdinand Zahn, Uncertainty of Governmental Relief and the Crowding out of Flood Insurance, Environmental and Resource Economics 54 (2): 179–200

3. Government Responsibilities under Principle 3

Principle 3 reflects the needs of reforming the current catastrophe disaster compensation arrangements under the “Whole-Nation System”, in order to enhance the collaboration between insurance industry and government. Therefore, some arrangements of the “Whole-Nation System” should be reformed—e.g. counterpart aid—to avoid crowding out private insurance.

How to coordinate the “Whole-Nation System” and market-based catastrophe insurance depends on whether relief under the “Whole-Nation System” crowds out private insurance transactions. Basic rational choice theory tells us that if individuals treat ad hoc relief from the “Whole-Nation System” as a substitute for insurance, they will underinsure or fail to insure at all. According to the empirical studies on different post-disaster relief schemes comparing


262 Raschky, Paul A., Reimund Schwarze, Manijeh Schwindt, and Ferdinand Zahn, Uncertainty of Governmental Relief and the Crowding out of Flood Insurance, Environmental and Resource Economics 54 (2): 179–200
Austria, where governmental relief is certain but incomplete, and Germany, where governmental relief is uncertain but more complete, the results show that “expected governmental relief has a strong crowding-out effect on insurance demand and this effect is even more pronounced when governmental relief is more certain.” In other words, the government relief scheme of Austria has stronger crowding-out effect for market-based insurance because of its certainty. Unfortunately, the China’s “Whole-Nation System” is more like the Austrian than the German model. It means under the “Whole-Nation System”, even introducing market-based catastrophe insurance may not play an expected and desired role. Take counterpart aid, in the form of direct disaster grants to affected households, for example. This form of assistance is likely to cause crowd-out private insurance markets, according to American data.

For example, an empirical study suggests that USA's Federal Emergency Management Agency ("FEMA") direct disaster grants have a statistically significant negative impact on average coverage per policy (“A $1,000 increase in the average IA grant decreases average insurance coverage by roughly $6,400”); but the volume of Small Business Administration ("SBA") disaster loans has no significant effect. In other words, government loans induce less crowd-out than direct grants. Counterpart aid under the “Whole-Nation System” operates much like disaster grants from the Individual Assistance (IA) program of FEMA, and thus would create substantial crowding-out of market-based insurance. Government loans, however, even at a low interest rate, will induce less crowd-out of insurance than direct disaster grants. Therefore, the form of counterpart aid could be changed into government loans rather than maintain direct disaster grants.

V. Conclusion

Government is playing an expanding role in catastrophe disaster aid, relief and compensation around the world. The spent money is sharply rising and this trend is evident in U.S., European, and many other countries. The same is happening in China, where government traditionally plays a fundamental role in dealing with catastrophe disasters.

Based on the above analysis, we may admit that the “Whole-Nation System” is necessity because it works well in short-run as emergency relief, especially in the absence of a catastrophe.
insurance market. In addition, government will carry on this system because it can help government gain support from people. When disaster provides a unique opportunity for government to show its responsibility and accountability, it is not difficult to imagine that the “Whole-Nation System” with its powerful capability will increase people’s support to the government. If only for political consideration, it is hard to believe that Chinese government will totally give up the “Whole-Nation System”, even if it has a lot of problems.

Nonetheless, the “Whole-Nation System” needs reform. It might be proper to combine the “Whole-Nation System” with catastrophe insurance in order to marry the merits of both private market and public government. It seems clear that the “Whole-Nation System” mainly works well in emergency relief. Beyond that, government should encourage and support catastrophe insurance to be responsible for risk finance and loss compensation.

Alford once raised a question in Prospects for the Professions in China, “Whether developing countries have a fateful choice: to embrace Western models of professional organization as they now exist, or to set off on an independent path, adapting elements of Western practices to their own historical and cultural situation?” Though the answer might be "blowing in the wind," I wish the proposed catastrophe insurance market-enhancing framework could help capture some part of that answer. Hopefully it could shed light on solving the universal dilemma of how to manage catastrophe risk efficiently and cover disaster losses fairly.

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267 The impact of natural disasters on support for authorities is conditional on governmental performance during and after the shock. For a transitional state like China, government’s legitimacy depends on not only its economic performance, but also its response and accountability to the people. A similar example presents in Russia. According to an empirical study conducted in the areas affected by the disaster over the course of the summer of 2011 in Russia, it indicates that active government performance and generous aid increase loyalty to the authorities among people directly affected by the disaster. See Lazarev, Y. A., A. S. Sobolev, I. V. Soboleva, and B. Sokolov, Trial by Fire: A Natural Disaster’s Impact on Support for the Authorities in Rural Russia, World Politics 66, no. 4 (2014).