

REGULATION BY GOVERNMENT-SPONSORED REINSURANCE IN CATASTROPHE MANAGEMENT

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I. INTRODUCTION

For over a century, reinsurance has been the preferred vehicle to shed primary insurers' catastrophe risk exposure.¹ The Cologne Reinsurance Company was the first professional reinsurance company, founded in 1842 following a catastrophic fire in Hamburg the same year.² Insurers have an increasing demand for more financial capacity when underwriting catastrophic risks. For example, reinsurers paid primary insurers 60 percent of the insured losses from the September 11 terrorist attacks, 65 percent from Hurricane Katrina, and 40 percent from Hurricane Sandy more recently.³

With respect to catastrophic risks, reinsurance's role takes several forms. Reinsurance can take a significant portion of the insured losses from primary insurers, diversify catastrophe risks globally, supply underwriting assistance, and regulate insurers' behavior to promote risk mitigation.⁴

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¹ Rajna Gibson, Michel A. Habib, & Alexandre Ziegler, *Financial Markets, Reinsurance, and the Bearing of Natural Catastrophe Risk*, SWISS FIN. INST., U. ZURICH 1, 2 (2007), https://www.researchgate.net/publication/228810986_Financial_Markets_Reinsurance_and_the_Bearing_of_Natural_Catastrophe_Risk.

² *An Introduction to Reinsurance*, SWISS RE (July 12, 2002), http://www.swissre.com/publications/An_introduction_to_reinsurance.htm.

³ FED. INS. OFF., U.S. DEP'T OF TREASURY, THE BREADTH AND SCOPE OF THE GLOBAL REINSURANCE MARKET AND THE CRITICAL ROLE SUCH MARKET PLAYS IN SUPPORTING INSURANCE IN THE UNITED STATES 15 (2014), <http://www.treasury.gov/initiatives/fio/reports-and-notice/Documents/FIO%20-%20Reinsurance%20Report.pdf>.

⁴ See generally Marcos Antonio Mendoza, *Reinsurance as Governance: Governmental Risk Management Pools as a Case Study in the Governance Role Played by Reinsurance Institutions*, 21 CONN. INS. L.J. 53 (2014); Aviva Abramovsky, *Reinsurance: The Silent Regulator?*, 15 CONN. INS. L.J. 345, 346, 373 (2009); Veronique Bruggeman, Michael Faure & Tobias Heldt, *Insurance Against Catastrophe: Government Stimulation of Insurance Markets for Catastrophic Events*, 23 DUKE ENVTL. L. & POL'Y F. 185, 186 (2012); VÉRONIQUE BRUGGEMAN, COMPENSATING CATASTROPHE VICTIMS: A COMPARATIVE LAW AND ECONOMICS APPROACH 130 (2010); David M. Cutler & Richard J. Zeckhauser, *Reinsurance for Catastrophes and Cataclysms*, in THE FINANCING OF

These roles often go beyond risk transfer and risk financing and expand to risk regulation for primary insurers. The former role has been discussed at length in law and economics literature,⁵ but regulation by reinsurance has not been widely discussed and has even qualified as problematic. Moreover, private reinsurance has come under scrutiny due to catastrophe insurance cycles that may lead to insurance unavailability and excessive prices, especially after a major event.⁶

Government-sponsored reinsurance, which marries the merits of both the government and private reinsurance, has gained increasing attention in the law and economics literature, and these programs have increased substantially in practice. Many countries use government-sponsored reinsurance to address catastrophe risks, including France (Caisse Centrale de Réassurance), Australia (Australian Reinsurance Pool Corporation), Japan (Japan Earthquake Reinsurance Co., Ltd.), Turkey (Turkish Catastrophe Insurance Pool), Netherlands (Nederlandse Herverzekeringsmaatschappij voor Terrorismedschaden), Thailand (National Catastrophe Insurance Fund), United States (Terrorism Risk Insurance Program and the Florida Hurricane Catastrophe Fund), Belgium (Caisse nationale des Calamités and the Terrorism Reinsurance and Insurance Pool), and Denmark (Terrorism Insurance Pool for Non-Life Insurance).⁷ Most of the reinsurance programs cover natural disasters. Meanwhile, many questions about those government-sponsored reinsurance programs have been raised. Why does the government adopt reinsurance as an intervention tool for catastrophe risks? Why might the government be motivated to structure its financial support in this manner rather than in others, such as providing direct compensation to victims of catastrophes? How could the reinsurance industry help regulate catastrophe insurers? How well have government-sponsored reinsurance programs worked? And have government-sponsored reinsurance programs resulted in any unintended

CATASTROPHE RISK 254 (Kenneth A. Froot ed., 1999); FED. INS. OFF., U.S. DEP'T OF TREASURY, *supra* note 3, at 1.

⁵ Many articles are discussing reinsurance as risk transfer and compensation to catastrophe victims. See Véronique Bruggeman, Michael G. Faure & Karine Fiore, *The Government as Reinsurer of Catastrophe Risks?*, 35 THE GENEVA PAPERS ON RISK AND INS.-ISSUES AND PRACTICE 369, 378 (2010); David Durbin, *Managing Natural Catastrophe Risks: The Structure and Dynamics of Reinsurance*, 26 THE GENEVA PAPERS ON RISK AND INS.-ISSUES AND PRACTICE 297 (2001); Cutler & Zeckhauser, *supra* note 4, at 237; J. David Cummins, *Reinsurance for Natural and Man-Made Catastrophes in the United States: Current State of the Market and Regulatory Reforms*, 10 RISK MGMT. & INS. REV. 179, 193 (2007).

⁶ Durbin, *supra* note 5, at 297-300.

⁷ Bruggeman, et al., *supra* note 4.

consequences?

To discuss all these questions is not possible within the scope of this Article. This Article will mainly argue why the Chinese government should adopt government-sponsored reinsurance and how to expand regulation by reinsurance to achieve optimal catastrophe risk management. The Article begins by introducing basic principles of reinsurance. Next, the Article explores the main regulatory techniques of reinsurance which offer primary insurers incentives to underwrite appropriately and mitigate risk. Then, the Article discusses reasons why the private reinsurance market cannot provide adequate coverage for catastrophe risks and the arguments for government-sponsored reinsurance. Next, the Article examines and compares several typical government-sponsored reinsurance programs, including programs in France (Caisse Centrale de Réassurance (CCR)), Japan (Japanese Earthquake Reinsurance Scheme (JERS)), and Turkey (Turkish Catastrophe Insurance Pool (TCIP)), in which primary insurers are regulated by reinsurance. Finally, the Article argues that China should adopt government-sponsored reinsurance to address catastrophe risks, and the possibility and feasibility of regulation by government-sponsored reinsurance in China is addressed.

II. REINSURANCE BASICS

A. INTRODUCTION OF REINSURANCE

Reinsurance can be understood simply as insurers' insurance. Under an insurance contract, a policyholder is protected from loss by transferring risk to an insurer; analogously, under a reinsurance contract, an insurer (the cedent or ceding company) is protected from exposure by transferring risk to a reinsurer.⁸ From the demand perspective, there are many theoretical explanations for a primary insurer's decision to purchase reinsurance. For example, Hoerger, Sloan, and Hassan consider that the motive for reinsuring is to avoid bankruptcy, even for an insurer that is not averse to risk (a risk-neutral insurer).⁹ According to other explanations, insurers demand reinsurance if they face catastrophic losses, insufficient

⁸ FED. INS. OFF., U.S. DEP'T OF TREASURY, *supra* note 3, at 1.

⁹ They use their model to assess how the insurer's surplus, size, and volatility of losses affect the amount of reinsurance the primary insurer purchases. *See generally* Thomas J. Hoerger, Frank A. Sloan & Mahmud Hassan, *Loss Volatility, Bankruptcy, and Insurer Demand for Reinsurance*, 3 J. OF RISK AND UNCERTAINTY 221, 221-222, 225 (1990).

underwriting capacity, higher loss volatility, lower surplus-to-premium ratios, or in the course of retiring from a territory or class of business.¹⁰

From the supply perspective, reinsurance is available from many sources, both domestic and abroad. The providers generally include professional reinsurers, pools and syndicates, direct insurers, and government agencies, which are not mutually exclusive.¹¹ For example, many direct insurers are legally empowered to sell reinsurance, and they still purchase extra reinsurance from foreign professional reinsurers.

There are two broad categories of reinsurance agreements: treaty reinsurance and facultative reinsurance. Treaty reinsurance covers broad groups of policies and binds the cedent to cede a specific portion of the risk of an entire class of business, such as all property coverage written by the cedents, to a reinsurer through one contract.¹² Compared to treaty reinsurance, facultative reinsurance is often used to cover specific and catastrophic risks¹³ because facultative reinsurance allows reinsurers to engage in significant underwriting prior to placing the policy and enables primary insurers to spread the risks of catastrophic losses that would otherwise be beyond their underwriting capacity.¹⁴

B. REINSURANCE FOR CATASTROPHE INSURERS

In the property-casualty market, the role of reinsurance is more apparent following catastrophes than after other perils. Catastrophes have a low probability of occurrence but cause very significant human and financial losses. Insurers are reluctant to underwrite catastrophes and even exclude these risks from coverage. The general theoretical explanation for why primary insurers do not cover catastrophe losses is that losses from these events are too large and too highly correlated for insurers to bear

¹⁰ KENNETH S. ABRAHAM, *INSURANCE LAW AND REGULATION: CASES AND MATERIALS* 739 (2005); Patrick Brockett, Robert C. Witt & Paul R. Aird, *An Overview of Reinsurance and the Reinsurance Markets*, 9 J. OF INS. REG. 432 (1991); BERNARD L. WEBB, CONNOR M. HARRISON & JAMES J. MARKHAM, *INSURANCE OPERATIONS* 2 (1997).

¹¹ Bernard L. Webb, *Reinsurance as a Social Tool*, in 1 ISSUES IN INS. 403, 413-414 (Everett D. Randall ed., 1987).

¹² BARRY R. OSTRAGER & MARY KAY VYSKOCIL, *MODERN REINSURANCE LAW AND PRACTICE* 2-4 to 2-7 (2d ed. 2000).

¹³ ROBERT H. JERRY, II, *UNDERSTANDING INSURANCE LAW* 1016-1018 (4th ed. 2007); GRAYDON S. STARING, *THE LAW OF REINSURANCE* 14-16 (2015).

¹⁴ BARRY OSTRAGER & THOMAS NEWMAN, *HANDBOOK ON INSURANCE COVERAGE DISPUTES* 991 (12th ed. 2004).

them.¹⁵ For primary insurers, losses from catastrophes do not satisfy the conditions of statistical independence and hence are not locally insurable.¹⁶ Reinsurance plays a major role in making catastrophes insurable and serves an important function as protection against the accumulation of losses from catastrophes.¹⁷ For reinsurers, because of their ability to diversify globally, catastrophe risks can be characterized as globally insurable.¹⁸ For example, the risk of hurricanes in the United States is independent of the risk of earthquake in China. This provides the economic motivation for reinsurers to aggregate catastrophe risks over geographic regions and different catastrophe lines.¹⁹ By diversifying losses across the world, catastrophes may not impose unbearable losses on the reinsurer when compared to its overall book of business, making it possible for reinsurers to provide coverage and pay losses.²⁰

While primary insurance tends to be a local business, reinsurance is more of an international business, especially for catastrophic risks.²¹ For example, in 2005, Hurricane Katrina caused around \$90 billion in insured property losses in the United States, of which non-US reinsurers paid approximately \$59 billion.²² Because US primary insurers can access the global reinsurance market, they are able to provide coverage and pay

¹⁵ “When losses are highly correlated, insurers’ claims experience is expected to be lumpy – the presence of one claim implies a likelihood of many claims. Several years may result in no claims, but some years will have gigantic levels of claims, and the strain of being prepared for a disaster year means insurers must either charge high premiums, or face the risk of bankruptcy. The conventional wisdom is that insurers choose to exclude these risks from coverage, rather than expose themselves to the year-to-year uncertainty endemic to correlated risks.” See Peter Molk, *Private Versus Public Insurance for Natural Hazards: Individual Behavior’s Role in Loss Mitigation*, in RISK ANALYSIS OF NATURAL HAZARDS (Paolo Gardoni et al. eds., Springer, 2015); see also Jerry, II, *supra* note 13; ABRAHAM, *supra* note 10.

¹⁶ Cummins, *supra* note 5, at 181-182.

¹⁷ FED. INS. OFF., U.S. DEP’T OF TREASURY, *supra* note 3, at 1.

¹⁸ Dwight Jaffee, *Catastrophe Insurance*, in RESEARCH HANDBOOK ON THE ECONOMICS OF INSURANCE LAW, 166-167 (Daniel Schwarcz & Peter Siegelman eds., 2015).

¹⁹ *Id.*

²⁰ Cummins, *supra* note 5, at 182.

²¹ Cutler & Zeckhauser, *supra* note 4, at 237.

²² GLOBAL REINSURANCE FORUM, GLOBAL REINSURANCE: STRENGTHENING DISASTER RISK RESILIENCE, 8, 11 (2014), <https://www.hannover-re.com/306809/global-reinsurance-forum-grf-report-2014.pdf>.

claims.²³ The United States is not an isolated example; reinsurers have assumed a large portion of insured natural catastrophe losses in the world. For example, in 2011, global insured catastrophe losses reached \$110 billion, and reinsurers assumed more than half (Figure 3). The largest reinsurers are in Europe and the Caribbean and are not confined to domestic reinsurers.²⁴

In addition, reinsurers have developed new products such as catastrophe bonds, catastrophe derivatives, contingent capital, sidecars, and other hybrid products to facilitate new capital flows from the capital market into the reinsurance market.²⁵ As a result, capital in the reinsurance market has generally been increasing year-over-year for most of the past decade (Figure 2).²⁶ For example, as of mid-2014, global reinsurance capital amounted to \$570 billion (\$511 billion is classified as traditional capital and \$59 billion as alternative capital).²⁷ This accessible outside capital enables reinsurers to assume more insured catastrophe losses.

²³ Cummins, *supra* note 5, at 184.

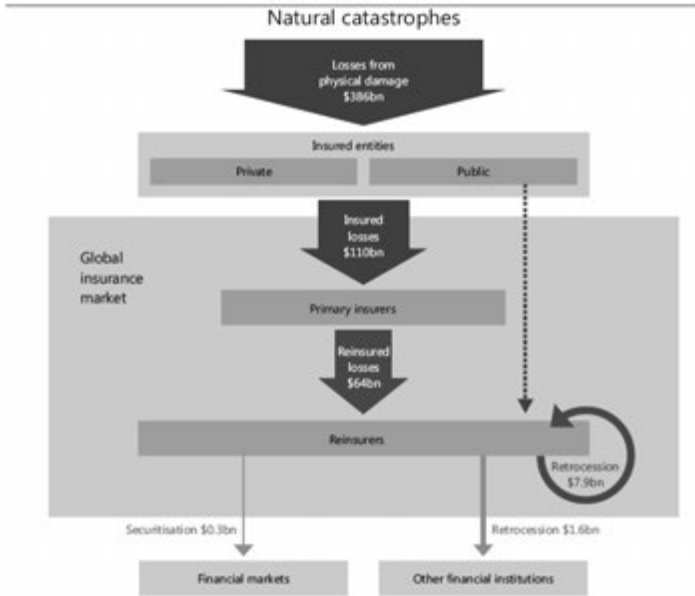
²⁴ Europe is the origin of reinsurance business, and in Europe, the insurance tax laws do allow tax-deductible reserves against future losses. In the Caribbean, a number of countries have created special tax havens. *See* Jaffee, *supra* note 18, at 167.

²⁵ Catastrophe bonds are risked-linked securities that transfer catastrophe risks from insurers to investors through fully-collateralized special purpose vehicles (SPV). Catastrophe derivatives are financial contracts used to spread catastrophe risk to capital market investors that derive value from the value of financial instruments, events or conditions; for example, the event can be a wind storm making landfall within a certain distance of a given location. A contingent capital arrangement is a type of financing that is arranged before a loss occurs. Sidecars are special purpose vehicles formed by insurance and reinsurance companies to provide additional capacity to write reinsurance, usually for property catastrophes and marine risks. *See* Partner Re, *A Balanced Discussion on Insurance Linked-Securities* (2008), www.partnerre.com; Cummins, *supra* note 5, at 195.

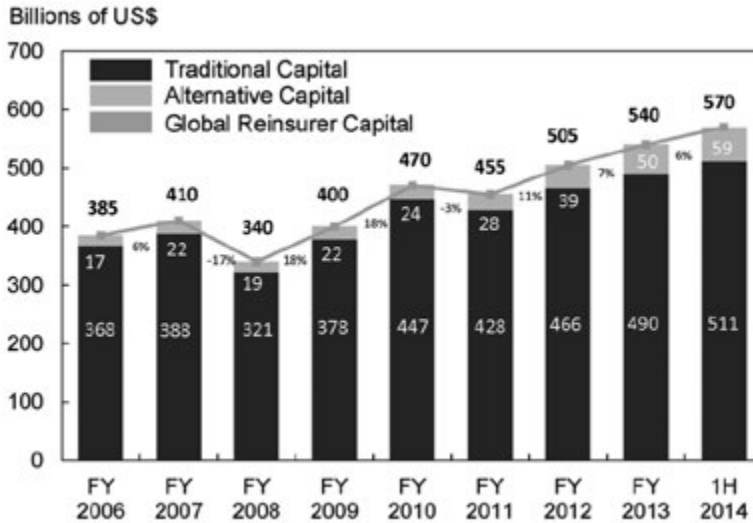
²⁶ Cummins, *supra* note 5, at 193-194.

²⁷ AON BENFIELD, THE AON BENFIELD AGGREGATE 3 (2014), http://thoughtleadership.aonbenfield.com/Documents/201409_aba_1h_2014.pdf.

Figure 1. Catastrophe risk transfer in the international reinsurance market, 2011²⁸



²⁸ Sebastian Von Dahlen & Goetz Von Peter, *Natural Catastrophes and Global Reinsurance—Exploring the Linkages*, 2012 BIS Q. REV. 23, 27 (Dec. 10, 2012), http://www.bis.org/publ/qtrpdf/r_qt1212e.pdf.

Figure 2. Global reinsurer capital, 2006–2014²⁹

III. REGULATORY ACTIVITIES OF REINSURANCE

In many respects, reinsurance often goes beyond pure risk transfer and expands to help solve catastrophic risk management issues through serving as an enforcer of compliance with government regulations and reinsurance contracts.³⁰ A major difficulty with catastrophe reinsurance is moral hazard, a problem also encountered by primary insurance vis-à-vis policyholders. It is logical for primary insurers to change their behavior as soon as the risk is fully ceded to the reinsurer. As a private regulator, reinsurance provides incentives for the primary insurers to engage in mitigation and prevention of catastrophe losses, and thus reduce moral hazard. Reinsurance has a direct and significant impact on the business operation of primary insurance and even an indirect impact on the insureds, from contract design such as pricing, through underwriting and issuing of a

²⁹ AON BENFIELD, THE AON BENFIELD AGGREGATE: RESULTS FOR THE SIX MONTHS ENDED JUNE 30, 2014, 3 (2014), http://thoughtleadership.aonbenfield.com/Documents/201409_aba_1h_2014.pdf.

³⁰ Guido Funke, *The Munich Re View on Climate-Change Litigation*, in LIABILITY FOR CLIMATE CHANGE? EXPERTS' VIEWS ON A POTENTIAL EMERGING RISK 22, 23 (Munich Re 2010); Lawrence Samplatsky, *The Role of Reinsurance in Life Insurance Industry* 23 (2003) (unpublished LLM master thesis, University of Connecticut) (on file with author).

policy, and ending with agreeing or refusing to pay for a claim.³¹ This part introduces four main tools that almost all reinsurers use to one degree or another to control moral hazard: loss-sensitive premiums, the duty of utmost good faith, providing risk management service, and indirect regulation of insureds. To be clear, I do not contend that these activities will exclusively solve moral hazard, nor do I contend that moral hazard management provides an adequate description for addressing catastrophe risk. However, by supplying both the incentive and the know-how that primary insurers often lack, reinsurance can realize value enhancing.

A. LOSS-SENSITIVE PREMIUMS

Catastrophes usually cause numerous claims at the same time. Insurers tend to pass on correlated losses to their reinsurers and thus the moral hazard problem becomes severe.³² Traditionally, reinsurers could control moral hazard by monitoring primary insurers' business operations, including their underwriting activities and claims settlements. More importantly, reinsurers could use loss-sensitive premiums to control moral hazard. Loss-sensitive premiums generally refer to the situation where "the price of reinsurance is sensitive to concurrent reinsurance losses and to the prior period's losses total and reinsured losses."³³ Loss-sensitive premiums require that reinsurance premiums should reflect an actuarially fair cost and integrate into general techniques like deductibles, co-payments, and "ex post settling up."³⁴ Neil Doherty and Kent Smetters have proved that reinsurers can control moral hazard effectively by using loss-sensitive premiums when the insurers and reinsurers are not affiliates (i.e., not part of the same financial group).³⁵ They present a multiperiod principal-agent model of the reinsurance transaction and test it empirically. They find strong evidence for the use of loss-sensitive premiums when the insurer and reinsurer are not affiliates, and their results show that price controls can limit moral hazard.³⁶ Since insurers and reinsurers are generally not

³¹ Mendoza, *supra* note 4; Abramovsky, *supra* note 4; Samplatsky, *supra* note 30, at 23.

³² Neil Doherty & Kent Smetters, *Moral Hazard in Reinsurance Markets*, 72 J. OF RISK AND INS. 375 (2005).

³³ *Id.* at 382.

³⁴ *Id.* at 375-376; Loss-sensitive premium is also called the actuarially fair premium, or risk-based pricing. See Cutler & Zeckhauser, *supra* note 4, at 260.

³⁵ Doherty & Smetters, *supra* note 32.

³⁶ *Id.*

affiliates in underwriting catastrophe risks,³⁷ using loss-sensitive premiums is an effective regulatory tool for reinsurers to control moral hazard.

Is using loss-sensitive premiums feasible in practice? The answer could be yes, thanks to risk-sharing mechanisms developed by reinsurance and less rate regulation in reinsurance transactions. First, several effective risk-sharing mechanisms are often introduced for catastrophe reinsurance premium design. The first one is retrospective rating, which adjusts premiums based on losses incurred during the policy period.³⁸ The second one is experience rating, which adjusts premiums based on losses in previous periods and which is useful when retrospective rating is not available.³⁹ Furthermore, although catastrophe perils are relatively rare, when series data on losses and claims is missing, the alternative method is using exposure-based modeling, which relies on scientific information and expert opinion; claims experience is only used to check and calibrate the model.⁴⁰ Second, compared to primary insurance, reinsurance markets are lightly regulated except in a few countries such as the United Kingdom, where reinsurers are regulated in the same way as direct insurers.⁴¹

B. THE DUTY OF UTMOST GOOD FAITH

Primary insurers' duty of utmost good faith is the core principle of the reinsurance relationship.⁴² Utmost good faith is an expressive phrase borrowed from Roman law, *uberrima fides*, which is defined as the "most abundant good faith; absolute and perfect candor or openness and honesty; the absence of any concealment or deception, however slight."⁴³ The reinsurance premium is less than the primary insurance premium; otherwise, primary insurers would have no incentives to underwrite such risk. Thus reinsurers cannot duplicate the costly but necessary efforts of the primary insurer in evaluating risks and handling claims. Through obligating

³⁷ See *id.* at 378 ("Insurance of natural catastrophes is often undertaken by regional or national primary insurers and reinsured by national or international reinsurance firms.").

³⁸ *Id.* at 375-376.

³⁹ *Id.* at 382-384.

⁴⁰ SWISS RE, UNDERSTANDING REINSURANCE: HOW REINSURERS CREATE VALUE AND MANAGE RISK 12 (2005), <http://www.grahambishop.com/DocumentStore/SwissRe%20Understanding%20reinsurance.pdf>.

⁴¹ Cummins, *supra* note 5, at 201.

⁴² See BARRY R. OSTRAGER & MARY KAY VYSKOCIL, MODERN REINSURANCE LAW AND PRACTICE 91 (2014).

⁴³ *Utmost Good Faith*, BLACK'S LAW DICTIONARY (6th ed. 1990).

primary insurers to act in good faith, reinsurers can control moral hazard through “invisible” monitoring without high cost.⁴⁴

The duty of utmost good faith requires the primary insurer to disclose all material facts which may affect the subject risk.⁴⁵ Those material facts may include the reinsured’s underwriting process; the reinsured’s amendment, renewal, or commutation in the placing of reinsurance; the payment of claims; and whether risks have been ceded fraudulently contrary to a treaty or representations.⁴⁶ As one court has stated, “[I]nsurance authorities are agreed that a ceding company, which is in possession of all the details relating to the risk, is required to exercise the utmost good faith in all its dealings with the reinsurer.”⁴⁷ This places the reinsurer in the same position as the reinsured “to give him the same means and opportunity of judging...the value of risks.”⁴⁸ To be notable, utmost good faith requires the insurer to provide timely notice of claim in some courts,⁴⁹ because it permits the reinsurer “to reserve properly, to adjust premiums to reflect the loss experience under the reinsurance contract, and to decide whether to exercise the option of becoming associated with the ceding insurer in the handling and disposition of the claim.”⁵⁰

As the core principle of the reinsurance relationship, the utmost good faith is enforced by many mechanisms. The first mechanism is the specific reinsurance contract provisions. It is a kind of private legislation since the parties to the reinsurance contract are sufficiently sophisticated. For example, reinsurers often include the “audit and inspection clauses” in the reinsurance contract which require “the reinsured’s records relative to the contract sessions to be always open to the reinsurer at reasonable times.”⁵¹ Such clauses guarantee and protect reinsurers’ access to their reinsured’s underwriting and claims handling practices. The second

⁴⁴ In the reference to utmost good faith as the “invisible” monitoring force, the concept is borrowed from the metaphor of “the invisible hand” used by Adam Smith in economics.

⁴⁵ STEVEN PLITT, ET AL., 1A COUCH ON INSURANCE § 9:17, at 82-83 (3d ed. 2010).

⁴⁶ STARING, *supra* note 13, at 151-152.

⁴⁷ *Nw. Mut. Fire Ass'n v. Union Mut. Fire Ins. Co. of Providence*, 144 F.2d 274, 276 (9th Cir. 1944) (requiring disclosure of all material facts).

⁴⁸ *Sun Mut. Ins. Co. v. Ocean Ins. Co.*, 107 U.S. 485, 510 (1883).

⁴⁹ *See e.g., Fortress Re, Inc. v. Jefferson Ins. Co.*, 465 F. Supp. 333 (E.D.N.C. 1978), *aff'd*, 628 F.2d 860 (4th Cir. 1980); *Liberty Mut. Ins. Co. v. Gibbs*, 773 F.2d 15 (1st Cir. 1985).

⁵⁰ BARRY R. OSTRAGER & THOMAS R. NEWMAN, HANDBOOK ON INSURANCE COVERAGE DISPUTES, § 16.02, at 563 (5th ed. 1992).

⁵¹ STARING, *supra* note 13, § 15:8, at 333-334.

mechanism is court enforcement. The court often recognizes that primary insurers' failure to act in utmost good faith offers the reinsurer a defense to its reinsurance obligation.⁵² More importantly, the court requires of primary insurers such behavior as a condition precedent to reinsurers' performance of indemnity obligation.⁵³ In the case of catastrophes in which reinsurance is triggered by extremely large dollar-value claims, primary insurers will undoubtedly take the enforcement of utmost good faith into serious consideration. A third mechanism by which reinsurance promotes efficiency is longer-term relationship controls. Reinsurance is generally not a one-off deal but conducted as a long-term relationship. Long-term relationships bond both parties, and the reinsurer can increase the effectiveness of its monitoring because the reinsurer can use past experience to set future prices and terms, or even to refuse to underwrite.⁵⁴

C. PROVIDING RISK MANAGEMENT SERVICE

Reinsurers can act not only as capital suppliers but also as risk management service providers. For relatively simple products, reinsurers may simply act as capital suppliers. As for complex products, such as underwriting catastrophic risks, reinsurers may take a more active role, more analogous to product-design consultants, through facultative reinsurance.⁵⁵ Since reinsurers deal with different catastrophe lines among geographic regions in the world, they are in a better position to share their experiences with the ceding companies. Providing risk management service for the primary insurers can take several forms: (1) *Entry into the market*. Global reinsurers can help potential new market participants remove entry barriers, especially for those in developing countries, and allow insurers to enter this new market slowly by initially reinsuring a large portion of their risks.⁵⁶ (2) *Product design and underwriting assistance*. Reinsurers can supply expert knowledge to new market participants and provide related data to develop a pricing model for a new product.⁵⁷ For example, from 1998 to 2002, Swiss Re, cooperating with Beijing Normal University, completed the Digital Map of China Catastrophe Events, which includes

⁵² See e.g., *Liquidation of Union Indemn. Ins. Co. v. Am. Centennial Ins. Co.*, 674 N.E.2d 313, 319-320 (N.Y. 1996).

⁵³ See e.g., *Unigard Sec. Ins. Co., Inc. v. N. River Ins. Co.*, 4 F.3d 1049, 1054 (2d Cir. 1993).

⁵⁴ Abramovsky, *supra* note 4, at 383-384 n. 144.

⁵⁵ Samplatsky, *supra* note 30, at 26.

⁵⁶ Patrick Brockett, Robert C. Witt & Paul R. Aird, *An Overview of Reinsurance and the Reinsurance Markets*, 9 J. INS. REG. 3, 432, 440-444 (1991).

⁵⁷ Samplatsky, *supra* note 30, at 26.

historical data on geography, weather, and so on, since the twelfth century.⁵⁸ This digital map has been very helpful for the pricing of catastrophe insurance. (3) *Claims processing*. Reinsurers can review the basis of insurers' decisions, and reinsurance contracts allow the reinsurer to opt out of an insurer's decision to deny coverage. The judgment of a reinsurer typically provides guidance to ceding insurers that can prevent violations of unfair claims practices acts.⁵⁹

D. INDIRECT REGULATION OF INSUREDS

Besides primary insurers, reinsurers may even regulate behaviors of insureds and control their moral hazard.⁶⁰ Generally speaking, reinsurers have no direct contract relationship with the insureds. Because reinsurers and insureds are parties to a secondary indemnity agreement, reinsurers do not usually pay the original insureds.⁶¹ However, under the fronting agreement arrangement,⁶² the reinsurer might have the opportunity to regulate the insureds, even indirectly. The main purpose of the fronting agreement is to allow a reinsurer who is not locally licensed to do business.⁶³ One New York court described a fronting agreement as an arrangement where an insurer issued a policy on a risk "with an

⁵⁸ XI GUO & XINJIANG WEI, *The Difficulties and Solutions for Issuing Catastrophe Bonds in China*, 8 FRONTIERS L. CHINA 521, 550-553 (2013) (2005).

⁵⁹ Samplatsky, *supra* note 30, at 35-39.

⁶⁰ The reinsurer has strong incentives to regulate the insureds. Some primary insurance policy includes "cut-out" provisions which allow a direct action by the insureds against the reinsurer. "Cut-out" provisions allow "an endorsement to an insurance policy or reinsurance contract which provides that, in the event of the insolvency of the insurance company, the amount of any loss which would have been recovered from the reinsurer by the insurance company (or its statutory receiver) will be paid instead directly to the policyholder, claimant, or other payee, as specified by the endorsement, by the reinsurer." See REINSURANCE ASS'N OF AM., *Fundamentals of Property and Casualty Reinsurance*, 32 (2016), <http://www.reinsurance.org/files/public/07FundamentalsandGlossary1.pdf>.

⁶¹ DAVID M. RAIM, JOY L. LANGFORD, DANIEL W. GERBER, AARON J. AISEN & CHRISTOPHER H. BROWN, *NEW APPLEMAN INSURANCE LAW PRACTICE GUIDE* § 40.01 (2007).

⁶² Despite the slightly pejorative terms used in this arrangement, there is nothing illegal in a domestic insurer acting as a front for the unauthorized insurer. In fact, so long as all other regulatory goals are met, these relationships can allow for a significant increase in insurance capacity. See RAIM ET AL., *supra* note 61, at §40.04(5).

⁶³ *Union Sav. Am. Life Ins. Co. v. North Central Life Ins. Co.*, 813 F. Supp. 481, 484 (S. D. Miss. 1993).

understanding that another party will insure it.”⁶⁴ Therefore, the risks underwritten by a primary insurer who has made the fronting agreement with a reinsurer will be assumed in the end by the reinsurer.⁶⁵ In other words, the reinsurer will be responsible for the entire amount that it is required to pay under the original policy. Generally, the licensed insurer will receive a fee for acting as the “front,”⁶⁶ while the reinsurers can act as insurers to regulate insureds through risk-based pricing, contract design, claims management, and refusal to insure.

IV. REASONS FOR GOVERNMENT-SPONSORED REINSURANCE FOR CATASTROPHES

The previous section explored the main regulatory techniques of reinsurance which control primary insurers’ moral hazard and offer them incentives to underwrite appropriately and mitigate risk. This leads to the issue of how government-provided reinsurance works and how it differs from regulation by private reinsurance. Before answering these questions, a prerequisite discussion should be why the government is involved in catastrophe reinsurance and why not leave all catastrophe reinsurance to the private market. The main rationale offered to justify governments’ sponsoring catastrophe insurers and acting as reinsurers of catastrophe risks is the imperfections of private reinsurance.

Underwriting cycles show the imperfection of private reinsurance. The phenomenon of the underwriting cycle, which refers to the tendency of insurance markets to go through alternating phases of “hard” and “soft” markets, is an important characteristic of insurance markets.⁶⁷ Hard markets are usually triggered by capital depletions resulting from underwriting catastrophic losses of unexpected magnitude.⁶⁸ Figure 3 shows the infamous cyclical nature of property-casualty insurance from the

⁶⁴ *Allendale Mut. Ins. Co. v. Excess Ins. Co.*, 970 F. Supp. 265, 267 n.2 (S.D.N.Y. 1997).

⁶⁵ *Reliance Ins. Co. v. Shriver, Inc.*, 224 F.3d 641, 643 (7th Cir. 2000) (describing a fronting agreement as a “well-established and perfectly legal scheme” where policies are issued by state-licensed insurance companies and then immediately reinsured to 100 percent of face value).

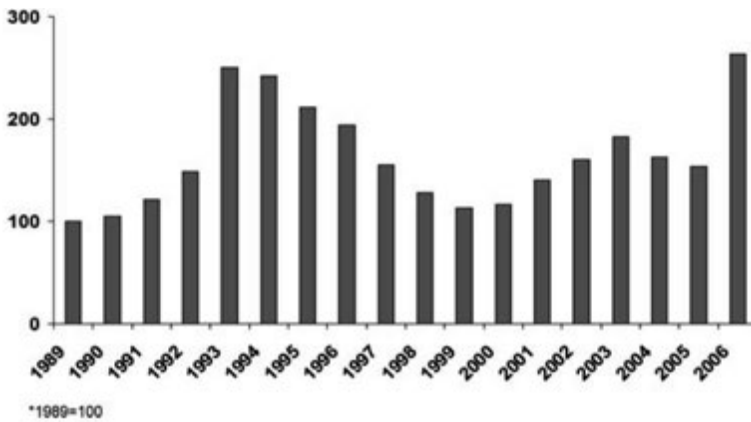
⁶⁶ *Venetsanos v. Zucker, Facher & Zucker*, 638 A.2d 1333, 1337 (N.J. Super. Ct. App. Div. 1994).

⁶⁷ Hard market leads to decreased supply but increased premium whereas in a soft market, coverage supply is plentiful and prices decline. *See* DAVID CUMMINS & OLIVIER MAHUL, *CATASTROPHE RISK FINANCING IN DEVELOPING COUNTRIES: PRINCIPLES FOR PUBLIC INTERVENTION*, 55 (2009).

⁶⁸ Cummins, *supra* note 5, at 179-220.

years following 1989. It clearly indicates that reinsurance prices are cyclical.⁶⁹ The hard market in the 1990s was caused by Hurricane Andrew (1992). The magnitude of losses from Andrew took insurers by surprise, and thirteen insurance companies even went bankrupt primarily as a result of capital depletions.⁷⁰ After the catastrophe, insurance companies improved loss estimation and risk management capabilities; insurers and catastrophe modeling firms revised upward their expectations of future hurricane losses.⁷¹ Accordingly, prices of reinsurance increased for the 1993 renewals.

Figure 3. US catastrophe reinsurance: rate on line index⁷²



To some extent, reinsurers are facing similar financing limitations to those faced by primary insurers.⁷³ During periods of hard markets, there

⁶⁹ Reinsurance prices increased and supply contracted following the 1992 Hurricane Andrew, paralleling the market response to later 2005 hurricane seasons.

⁷⁰ A.M. Best Company, *2006 Annual Hurricane Study: Shake, Rattle, and Roar* (May 2006).

⁷¹ Cummins, *supra* note 5, at 192.

⁷² The rate on line is a pricing concept, which is found by dividing the contractual reinsurance premium by the reinsurance limit and converting the result into a percentage. See Kenneth Froot, *The Intermediation of Financial Risks: Evolution in the Catastrophe Reinsurance Market*, 11 RISK MGMT. AND INS. REV. 281, 281-294 (2008);

⁷³ Many primary insurers do not have enough capital and surplus themselves to survive catastrophes, and they have to rely upon the reinsurance market to recompense catastrophic damages. See VERONIQUE BRUGGEMAN, COMPENSATING

is often insufficient reinsuring capacity. Why are so few assets allocated to catastrophe reinsurance? Since the market distortions appear to be more supply- (reinsurer) than demand- (primary insurer) related,⁷⁴ explanations for imperfections in the reinsurance market mainly consider supply restrictions. The explanations below are well documented in the law and economics literature.

First, informational asymmetries between capital providers and reinsurers about exposure levels and reserve adequacy can result in high costs of capital during hard markets.⁷⁵ It might be more costly for reinsurers to raise additional funds since capital providers cannot clearly separate performance into event losses and reinsurers' skill in peril selection.⁷⁶ Irrational investor behavior, such as investor "trend following," may also decrease the supply of capital to reinsurance after a major catastrophe.⁷⁷ The consensus in the economics literature is that shortages are driven by capital market and insurance market imperfections that prevent capital from flowing freely into and out of the reinsurance corporations in response to catastrophic losses.⁷⁸

A major catastrophe may deplete reinsurer capital and surplus, and require some time to replenish.⁷⁹ Without additional funds from capital providers, such depletion of equity capital is likely to result in raised premiums for reinsurance, which are above the expected loss of such

CATASTROPHE VICTIMS: A COMPARATIVE LAW AND ECONOMICS APPROACH 136 (2010).

⁷⁴ According to a set of demand–supply equilibrium points, graphed in terms of price and quantity of reinsurance provided, Froot shows a strong negative correlation between price and quantity supplied emerges. It suggests that supply shocks are the main driver rather than demand—a decline in supply results in an increase in price and decline in quantity of risk transfer. See Froot, *supra* note 72.

⁷⁵ CUMMINS & MAHUL, *supra* note 67, at 194.

⁷⁶ Kenneth Froot, *The Market for Catastrophe Risk: A Clinical Examination*, 60 J. OF FIN. ECON. 529, 529–571 (2001).

⁷⁷ Investor trend following refers to the situation that investors expect recent performance to continue, as a result, they tend to buy exposures that have recently performed well and to sell those that have not. *Id.*

⁷⁸ Ralph Winter, *The Dynamics of Competitive Insurance Markets*, 3 J. OF FIN. INTERMEDIATION 379–415 (1994); David Cummins & Patricia M. Danzon, *Price Shocks and Capital Flows in Liability Insurance*, J. OF FIN. INTERMEDIATION 6 (1): 3–38 (1997); David Cummins & Neil A. Doherty, *Capitalization of the Property-Liability Insurance Industry: Overview*, J. OF FIN. SERVICES RES. 21 (1–2): 5–14 (2002); CUMMINS & MAHUL, *supra* note 67, at 194.

⁷⁹ Froot, *supra* note 72, at 285.

coverage.⁸⁰ Using empirical evidence from the year following Hurricane Andrew for those insurers that had greater exposure to the southeastern United States and to hurricanes wherever they occur, Froot demonstrates that reinsurance “prices rise most where quantities decline most.”⁸¹

Second, reinsurers may have market power, and supply shortages and high prices after catastrophes may occur because reinsurers have no incentive to increase their capital. By putting less money at risk and preventing new entry, incumbent reinsurers keep prices high.⁸² The former Massachusetts Insurance Commissioner argued that market power among reinsurers is the main reason that catastrophe reinsurance has proved more profitable than insurance.⁸³ Barriers to entry are also relevant to the market power story.⁸⁴ The absence of entry barriers tends to suggest that there is no market power; it is entry barriers that permit sellers to keep prices above marginal costs. Froot has provided empirical evidence to support the hypothesis that there was considerable entry into the reinsurance market in the 1990s.⁸⁵

Third, the corporate form of reinsurance ownership may also contribute to short supply in the reinsurance market in the wake of catastrophes.⁸⁶ Corporations create agency costs because managers’ (“agents”) interests may not perfectly align with those of shareholders (“principals”). Managers act in many ways that do not maximize the corporation’s value, but instead advance their personal financial interests.⁸⁷

⁸⁰ Frank A. Sloan & Lindsey M. Chepke, *Reinsurance*, in *MEDICAL MALPRACTICE* 247, 252-253 (2008).

⁸¹ Froot, *supra* note 76.

⁸² Froot, *supra* note 76, at 559.

⁸³ *Id.*

⁸⁴ *Id.* at 560.

⁸⁵ Froot notes that the 1990s were not crisis years, but sellers could have been poised for entry when and if prices of reinsurance rose. *Id.*

⁸⁶ Froot, *supra* note 72, at 287. See HOWARD KUNREUTHER, MARK V. PAULY & THOMAS RUSSELL, DEMAND AND SUPPLY SIDE ANOMALIES IN CATASTROPHE INSURANCE MARKETS: THE ROLE OF THE PUBLIC AND PRIVATE SECTORS, Paper prepared for the MIT/LSE/Cornell Conference on Behavioral Economics 17-18 (2004) (suggesting that capital suppliers may believe that the high losses they experienced are not random which reflects reinsurer mismanagement).

⁸⁷ Froot, *supra* note 76, at 567; Frank A. Sloan & Lindsey M. Chepke, *Reinsurance*, in *MEDICAL MALPRACTICE*, 247-276, 253 (2008).

V. GOVERNMENT-SPONSORED CATASTROPHE REINSURANCE PROGRAMS: EXAMPLES

Section III described the tools available to reinsurers in regulating insurers and the underwritten catastrophe risks. We saw that through contract design (loss-sensitive premiums), utmost good faith, providing risk management service, and indirect regulation of insureds, reinsurance has the capacity to perform a social function that is regulatory in nature: less moral hazard on the part of primary insurers and better preparedness on the part of insureds. Section IV explained why much of the reinsurance for catastrophe risks in the world is sponsored by the government. Compared with the capital shortfall of private reinsurers, the government can channel capital effectively and quickly after catastrophes since it can raise money through taxes or borrow money by issuing debt or government bonds.⁸⁸ This part examines how government-sponsored reinsurance programs work. Government-sponsored reinsurance is increasingly welcomed by law and economics scholarship as a way to manage catastrophic risks.⁸⁹ Meanwhile, government-sponsored reinsurance has increased substantially in practice, and many programs are often established when primary-insurance markets break down. It is not possible within the scope of this Article to critically analyze all of the programs that exist, some of which were mentioned in the introduction. Accordingly, this discussion will be limited to the French CCR, the Japanese JERS and the Turkish TCIP. As these examples demonstrate, there is wide variation in the nature and extent of regulation through catastrophe reinsurance across different countries.

Government-sponsored reinsurance is a kind of public-private partnership that marries the merits of both government and reinsurance.⁹⁰ The origins of such partnerships can be traced to the nuclear liability conventions which emerged in the 1960s.⁹¹ Government-sponsored reinsurance programs have since expanded to many lines of insurance,

⁸⁸ Cutler & Zeckhauser, *supra* note 4, at 258-259.

⁸⁹ See e.g., Bruggeman, Faure & Heldt, *supra* note 4, at 212; Howard Kunreuther & Erwann Michel-Kerjan, *Managing Catastrophic Risks through Redesigned Insurance: Challenges and Opportunities*, In HANDBOOK OF INS., 517, 523 (George Dionne ed., 2013); Bruggeman, Faure & Fiore, *supra* note 5, at 374.

⁹⁰ Howard Kunreuther & Mark Pauly, *Rules Rather than Discretion: Lessons from Hurricane Katrina*, 33 J. OF RISK & UNCERTAINTY 101, 1112-113 (2006); Saul Levmore & Kyle D. Logue, *Insuring Against Terrorism--and Crime*, 102 MICH. L. REV. 268, 314 (2003).

⁹¹ The Price-Anderson Act, concerning nuclear facilities, is an example of this model. See Bruggeman, Faure & Fiore, *supra* note 89, at 376.

including medical malpractice,⁹² expropriation insurance,⁹³ crop insurance programs,⁹⁴ and terrorism insurance after the September 11 terrorism attack.⁹⁵ Since the government has substantial credit capacity due to its ability to raise money through tax or borrow money by issuing debt far more readily than private insurers or reinsurers,⁹⁶ it is widely recognized that the government can help address catastrophic risks in some respects, and can thus be used to support the failures of the primary insurance market.⁹⁷

A. THE FRENCH CCR

The French government-sponsored reinsurance for natural disasters takes the form of subsidized government reinsurance with mandatory private primary insurance.⁹⁸ In France, private insurers offered little

⁹² For example, New Jersey enacted the New Jersey Medical Malpractice Reinsurance Association in 1976, and any member of the association could be approved by the association to write malpractice coverage. The insurer would then be reinsured by the association either in full or in part. See Vincent R. Zarate, *N.J. Malpractice Unit Activated*, J. OF COM. 9 (1977).

⁹³ For example, in the U.S., expropriation insurance written by the Overseas Private Investment Corporation (OPIC) was a purely governmental program, and eventually OPIC turned the program over to private insurers, with OPIC functioning only as a reinsurer. See Bernard Webb, *Reinsurance as a Social Tool*, in ISSUES IN INS. 279, 326 (1984).

⁹⁴ For example, the Federal Crop Insurance Corporation (FCIC) is authorized to provide reinsurance for “all risks” crop written by private insurers. See 1980 U.S.C.C.A.N., 5949.

⁹⁵ After 11 September 2001, when airline risks became more difficult to insure, the U.S. federal government guaranteed insurance coverage. See Kenneth Abraham, *United States of America. Liability for Acts of Terrorism under US Law in TERRORISM, TORT L. AND INS.: A COMP. SURVEY*, 176–188 (B. A. Koch ed. 2004).

⁹⁶ Louis Kaplow, *Incentives and Government Relief for Risk*, 4 J. OF RISK AND UNCERTAINTY 167, 167-175 (1991).

⁹⁷ See John V. Jacobi, *Government Reinsurance Programs and Consumer-Driven Care*, 53 BUFF. L. REV. 537 (2005); Daniel A. Schenck, *Next Step for Brownfields Government Reinsurance of Environmental Cleanup Policies*, 10 CONN. INS. L.J. 401 (2003); Mark A. Hall, *Government-Sponsored Reinsurance*, 19 ANNALS HEALTH L. 465 (2010); Bruggeman, Faure & Heldt, *supra* note 89, at 39; Kunreuther & Michel-Kerjan, *supra* note 89, at 517, 546.

⁹⁸ Lorilee Medders, Kathleen McCullough & Verena Jäger, *Tale of Two Regions: Natural Catastrophe Insurance and Regulation in the United States and the European Union*, 30 J. INS. REG. 171, 184 (2011).

coverage for natural catastrophe risks, and the government intervened through ad hoc assistance in the aftermath of disasters until 1982.⁹⁹ The 1982 disaster law required private insurers to underwrite catastrophic risks and permitted them to cede those risks to CCR, the state-guaranteed reinsurer.¹⁰⁰ To gain the benefit of the government guarantee, CCR pays an annual “premium” to the government (Article R. 431-16-2 Insurance Code), similar to private retrocession.¹⁰¹

CCR provides a coverage system which compounds twofold layers based on two separate treaties: a 50 percent quota share treaty and a stop-loss treaty with an unlimited governmental guarantee.¹⁰² Those risks not covered by the quota share treaty are subject to the stop-loss treaty. The stop-loss treaty with an unlimited governmental guarantee enables primary insurers to underwrite high severity hazards.

Loss-Sensitive Premiums. Loss-sensitive premiums require that reinsurance premiums should reflect an actuarially fair cost and reinsured losses. CCR offered coverage on identical terms and a rather low price to all ceding companies in the first fifteen years as a result of benefits from an unlimited guarantee from the French Treasury.¹⁰³ In 1997, CCR revised its reinsurance terms because of the deterioration of the claims figures and changes in the primary insurance market. It began to move forward to loss-sensitive premiums setting, and its rating of the “stop-loss” covers was decided based upon each individual insurer’s loss record.¹⁰⁴

Such loss-sensitive premiums setting represents a good start, but it still has a long way to go. With the governmental guarantee, CCR charges relatively lower premiums to primary insurers than other private reinsurance companies and thus crowds them out of the market.¹⁰⁵ On the

⁹⁹ David Moss, *Courting Disaster? The Transformation of Federal Disaster Policy since 1803*, NAT’L BUREAU OF ECON. RES., 307, 345 (Kenneth A. Froot, eds. 1999).

¹⁰⁰ Decree No. 82-706 of 10 August 1982 on the Reinsurance Operations for the Natural Catastrophe Risks by the *Caisse Centrale de Re’assurance*. Application of Article 4 of the Act No. 82-600 of 13 July 1982, JORF 11 August 1982. See Bruggeman, Faure & Fiore, *supra* note 5, at 379-380.

¹⁰¹ Suzanne Vallet, *Insuring the Uninsurable: The French Natural Catastrophe Insurance System*, in *Catastrophe Risk and Reinsurance: A Country Risk Management Perspective*, 199, 206 (Eugene N. Gurenko ed. 2004).

¹⁰² Medders, McCullough & Jäger, *supra* note 98, at 184.

¹⁰³ Vallet, *supra* note 101, at 211.

¹⁰⁴ Such price setting does not include quota share treaty. *Id.* at 211-212.

¹⁰⁵ Erwann Michel-Kerjan, *Catastrophe Economics: The National Flood Insurance Program*, 24 J. ECON. PERSP. 165, 183-184 (2010) (“The CCR is not a monopolistic disaster reinsurer. In fact, there are several reinsurers writing business

other hand, it will be the taxpayers who ultimately pay CCR's unlimited coverage that can offset damages.¹⁰⁶ France's relatively moderate exposure to natural disasters makes the operation of CCR suitable to France. It is still questionable to what extent CCR is capable of dealing with the next mega-catastrophe.

The Duty of Utmost Good Faith. The duty of utmost good faith is enforced by two mechanisms in the operation of CCR. First, the 50 percent quota share treaty of CCR contributes to primary insurers' performance of the duty of utmost good faith. Primary insurers have to retain half of the risks themselves under the 50 percent quota share treaty, which gives them an incentive to underwrite appropriately.¹⁰⁷ Second, the long-term relationship between CCR and the ceding companies also contributes to the performance of the duty of utmost good faith. As the state-guaranteed reinsurer, CCR has operated several decades and has abundant records of the ceding companies. Such experiences help CCR effectively monitor primary insurers' performance of utmost good faith.

Providing Risk Management Service. It is unclear whether CCR provides risk management services for the ceding companies. Nonetheless, as one of the top twenty reinsurance carriers in the world with an AAA rating from Standard & Poor's, CCR clearly has expertise in risk management.¹⁰⁸ Dealing with ceding companies of different sizes, differing legal forms, and various types of portfolios, CCR is in a better position to share its experiences in managing catastrophe risk and providing coverage for multiple types of natural hazards.

Indirect Regulation of Insureds. Since CCR is licensed to conduct business in France, there is no need for a fronting agreement arrangement. There is no empirical evidence of its indirect regulation of insureds.

B. THE JAPANESE JERS

The Japanese government-sponsored reinsurance for earthquakes takes the form of the government providing reinsurance capacity. JERS was established based on the Act on Earthquake Insurance in 1966 enacted after the Niigata earthquake in 1964.¹⁰⁹ Primary insurers issue standard

with primary reinsurers in France."); see Medders, McCullough & Jäger, *supra* note 98, at 184.

¹⁰⁶ Medders, McCullough & Jäger, *supra* note 98, at 185.

¹⁰⁷ Suzanne Vallet, *The French Experience in the Management and Compensation of Large scale Disasters*, in CATASTROPHIC RISKS AND INS. 293, 300 (2005).

¹⁰⁸ Medders, McCullough & Jäger, *supra* note 98, at 184.

¹⁰⁹ OECD, DISASTER RISK FINANCING IN APEC ECONOMIES 73 (2013),

residential policies which cover losses to personal dwellings and contents caused by earthquakes and volcanic eruptions and then cede these risks to JERS.¹¹⁰ JERS is a specialized reinsurance company but backed by the Japanese government. It can also be seen as an earthquake reinsurance pool, retaining a portion of the liability and retroceding the rest to private insurers (based on their market share) and to the Japanese government through reinsurance treaties.¹¹¹ To be clear, JERS only covers personal residential, not commercial, earthquake insurance.

The professional reinsurance business operations are all managed by JERS, not the Japanese government. Nevertheless, the successful operation of JERS depends on a commitment from the Japanese government, which provides significant reinsurance capacity as a last resort.¹¹² It can be illustrated by the aggregate limit of indemnity for earthquake insurance liabilities (JPY 6.2 trillion), which is shared by the private insurers and the government among different layers. The first layer, which covers earthquake insurance liabilities up to JPY 85 billion, is totally compensated by JERS; the second layer, which covers earthquake insurance liabilities over JPY 85 billion and up to JPY 348.8 billion, is compensated by equal contributions by the Japanese government (50 percent) and JERS and private insurers (due to retroceded risk from JERS; 50 percent); and the third layer, which covers earthquake insurance liabilities from JPY 348.8 billion to JPY 6.2 trillion, is mostly compensated by the Japanese government (99.6 percent) and a very small share by private insurers (0.4 percent) (Figure 4).¹¹³ If the earthquake insurance liabilities of one peril exceed JPY 6.2 trillion, residential policyholders' claims are reduced proportionately following the provisions of the Act on Earthquake Insurance.¹¹⁴

http://www.oecd.org/daf/fin/insurance/OECD_APEC_DisasterRiskFinancing.pdf.

¹¹⁰ Yuichi Takeda, *Government as Reinsurers of Last Resort: The Japanese Experience*, in *CATASTROPHE RISK AND REINSURANCE: A COUNTRY RISK MANAGEMENT PERSPECTIVE* 225-237 (Eugene N. Gurenko eds. 2004).

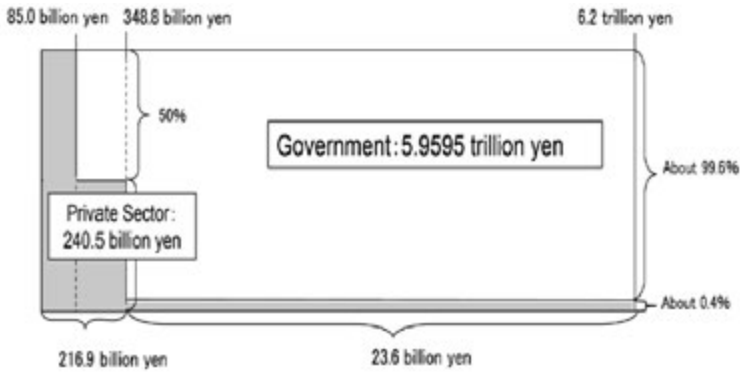
¹¹¹ Michael Faure & Jing Liu, *The Tsunami of March 2011 and the Subsequent Nuclear Incident at Fukushima: Who Compensates the Victims*, 37 *WM. & MARY ENVTL. L. & POL'Y REV.* 129, 149 (2012).

¹¹² Takeda, *supra* note 110.

¹¹³ *Id.*; OECD, *supra* note 109.

¹¹⁴ See OECD, *supra* note 109, at 73.

Figure 4. Risk allocation under the Japanese Earthquake Reinsurance Scheme¹¹⁵



Loss-Sensitive Premiums. Making the premiums loss-sensitive is one of the most challenging tasks for a public-private partnership. This is no exception for JERS. The reinsurance price of JERS is not market-based but determined by the Japanese government. The premiums are not loss-sensitive, but set to follow a general fair-value principle.¹¹⁶

The Duty of Utmost Good Faith. Primary insurers' duty of utmost good faith is extremely important for JERS. The primary insurers could cede 100 percent of the underwritten earthquake insurance exposure to JERS.¹¹⁷ If primary insurers underwrite inappropriately, JERS will assume all the bad risks. According to the requirement of utmost good faith, the primary insurers should disclose all material facts which may affect the subject risk. In order to enforce such a requirement, the Japanese government stipulated that all rating work is set solely by the Non-Life-Insurance Rating Organization of Japan (NLIRO) and not by primary insurers.¹¹⁸ The NLIRO has to file materials setting, modifying and revising the base rates to the Financial Supervisory Authority for

¹¹⁵ *Id.*

¹¹⁶ Currently the details of JER reinsurance contracts are not fully disclosed, except the names of the counterparties and the amount of reinsurance. It is difficult to supply the basic elements of the general fair-value principle. Some anecdotes from the Japanese insurance industry imply that affordability and sustainability are both important considerations of this principle. See Takeda, *supra* note 110, at 231.

¹¹⁷ THE GENEVA ASSOCIATION, *INSURERS' CONTRIBUTIONS TO DISASTER REDUCTION—A SERIES OF CASE STUDIES* 7, 48 (Meghan Orié & Walter R. Stahel eds., 2013).

¹¹⁸ Takeda, *supra* note 110, at 230-231.

approval.¹¹⁹ Under this approach, JERS is able to access the underwriting materials of its ceding companies. Besides this arrangement, the duty of utmost good faith is also enforced by reinsurance treaty provisions. The Earthquake Reinsurance Treaty between JERS and private insurance companies includes the retrocession provision, which provides that primary insurers cede their underwritten risks to JERS, and JERS in turn retrocedes the risks in the second layer to the primary insurers and the Japanese government with equal portion.¹²⁰ Retroceding 50 percent of the risk in the second layer to primary insurers contributes to their performance of the duty of utmost good faith.

Providing Risk Management Service. One purpose of establishing JERS is to facilitate loss mitigation and a recovery process through the insurance industry. However, in practice, the NLIRO, rather than JERS, undertakes major service works for primary insurers.

Indirect Regulation of Insureds. Since JERS is licensed to conduct business in Japan, there is no need for a fronting agreement. JERS has incentives to regulate insureds' behavior and awareness of earthquake risks because primary insurers cede 100 percent of the risks to JERS. For example, JERS uses deductibles to enhance individuals' risk mitigation efforts.¹²¹

C. THE TURKISH TCIP

Compared to CCR and JERS, the Turkish government does not establish a specific reinsurance company to assume catastrophe risk. The Turkish government provides contingent liquidity support when the payments of claims exceed TCIP's capacity.¹²² It could be regarded as reinsurance since it is the last resort. The first layer reinsurance arrangement under the mechanisms of TCIP is the international reinsurers, which assume the transferred risks from TCIP. Therefore, the regulatory techniques of reinsurance include both international reinsurers and the Turkish government.

¹¹⁹ *Id.* at 234.

¹²⁰ K. KAWACHIMARU, NON-LIFE INSURANCE RATING ORGANIZATION OF JAPAN, *Disaster Risk Management in Japan*, in CATASTROPHIC RISKS AND INSURANCE 303, 318 (2005).

¹²¹ If the premium exceeds \$550 per policy, this amount is the deductible; otherwise the deductible is equal to the premium of the policy. See Youbaraj Paudel, *A Comparative Study of Public-Private Catastrophe Insurance Systems: Lessons from Current Practices*, 37 GENEVA PAPERS 257, 278 (2012).

¹²² EUGENE GURENKO, EARTHQUAKE INSURANCE IN TURKEY: HISTORY OF THE TURKISH CATASTROPHE INSURANCE POOL, xi-xii (2006).

In 1999, Governmental Decree Law No. 587 on Compulsory Earthquake Insurance (“Decree Law”) came into force and gave birth to TCIP in the aftermath of the devastating Marmara earthquake.¹²³ TCIP is a public-private partnership (Figure 5). Insurance companies act as agents to TCIP and cede 100 percent of all risks acquired by TCIP, and they receive a commission from the pool.¹²⁴ TCIP transfers risks to international reinsurers through sharing pools under the management of international reinsurance companies, like Munich Re.¹²⁵ The claims payment of TCIP is dependent on international reinsurance and on the amount of funds collected (partially from the government).¹²⁶ The board of directors represents the government, experts, and insurance companies. The administrative body of TCIP is the General Directorate of Insurance within the Prime Ministry Under-Secretariat of the Treasury, but the business operation is managed by Milli Reasürans (“operational manager”), a national reinsurance company.¹²⁷

¹²³ *Id.* at 87-95.

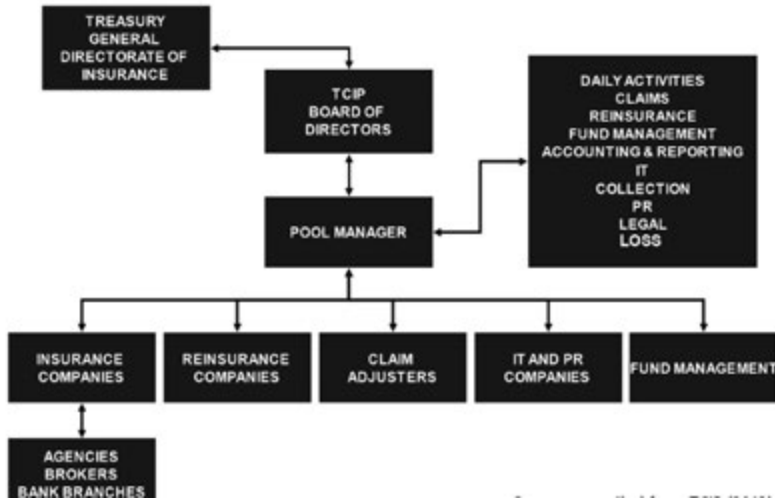
¹²⁴ See Johann-Adrian von Lucius, *A Reinsurer’s Perspective on the Turkish Catastrophe Insurance Pool (TCIP)*, in *CATASTROPHE RISK AND REINSURANCE: A COUNTRY RISK MANAGEMENT PERSPECTIVE* 217, 219 (Eugene N. Gurenko, eds. 2004) (stating that the TCIP supplies earthquake insurance to homeowners, and covers losses caused by earthquakes and earthquake-related catastrophes, such as fires, explosions, landslides, and tsunamis); Burcak Başbuğ-Erkan & Ozlem Yilmaz, *Successes and Failures of Compulsory Risk Mitigation: Re-evaluating the Turkish Catastrophe Insurance Pool*, 39 *DISASTERS* 782, 789 (2015).

¹²⁵ Başbuğ-Erkan & Yilmaz, *supra* note 124, at 782.

¹²⁶ It would only be triggered by an event equivalent to an earthquake in Istanbul with a 200-year return period (technically, an earthquake with an exceedance probability of 0.5 percent). See GURENKO, *supra* note 122, at xi.

¹²⁷ Başbuğ-Erkan & Yilmaz, *supra* note 124. All of its business functions—from sales to reinsurance to claim management—are subcontracted to the private insurance industry, and the TCIP has no public employees. See GURENKO, *supra* note 122.

Figure 5. Organizational chart of the Turkish Catastrophe Insurance Pool¹²⁸



Loss-Sensitive Premiums. Since the business operation of TCIP follows a market-oriented approach, and its underwritten risks are transferred to international reinsurers, it is reasonable for international reinsurers to charge loss-sensitive premiums to control the moral hazard of TCIP. Loss-sensitive premiums require that reinsurance premiums should reflect an actuarially fair cost, and they constrain TCIP to underwrite appropriately. With the burden from the reinsurance, TCIP adopts a differential risk-based pricing approach and imposes construction maintenance obligations on the insured in the policies to mitigate underwritten losses.¹²⁹

The Duty of Utmost Good Faith. Primary insurers play a different role in TCIP compared to their role in the French CCR or the Japanese JERS. Primary insurers act as agents to TCIP, and the pool assumes all the earthquake risks.¹³⁰ The duty of utmost good faith is not suitable for primary insurers. In contrast, TCIP transfers risk to international reinsurers.

¹²⁸ Başbuğ-Erkan & Yılmaz, *supra* note 124.

¹²⁹ Article 14 of Governmental Decree Law No. 587 on Compulsory Earthquake Insurance (“The owner who causes or allows the building and each independent section thereof to be altered contrary to the related design and in a way that will affect the load-bearing system, loses his entitlement to compensation in as much as the actual loss arises or increases because of such reason.”).

¹³⁰ von Lucius, *supra* note 124.

From the perspective of international reinsurers, it requires TCIP to perform the duty of utmost good faith. The organizational structure of TCIP, to some extent, might guarantee its performance through public-private partnership.

Providing Risk Management Service. Reinsurers play an important role as consultants, especially in the conception of TCIP. As a matter of fact, TCIP was formed with the cooperation of the World Bank, the Turkish Government, Milli Re, reinsurance brokers, and Munich Re.¹³¹ International reinsurers play an important role in providing risk management services and contribute to the operation of TCIP and catastrophe risk management in Turkey.

Indirect Regulation of Insureds. Since international reinsurers, such as Munich Re, are licensed to conduct business in Turkey, there is no need for a fronting agreement arrangement. There is no empirical evidence that TCIP indirectly regulates insureds.

D. CONCLUDING REMARKS

Controlling moral hazard and providing incentives to loss control benefit both reinsurers and primary insurers. Such efforts will encourage ceding companies to regulate behaviors of policyholders, decrease cost for ceding companies, and enhance profits for reinsurers. It is a win-win strategy for both reinsurers and primary insurers. Compared to private reinsurers, government-sponsored reinsurance meets more challenges to fulfill regulatory techniques due to political pressures and other constraints. Table 1 summarizes the regulation by government-sponsored reinsurance among the three countries in the preceding discussion.

¹³¹ WORLD FORUM OF CATASTROPHE PROGRAMMES, NATURAL CATASTROPHES INSURANCE COVER: A DIVERSITY OF SYSTEMS 163-164 (2008). http://www.wfcatprogrammes.com/c/document_library/get_file?folderId=13442&name=DLFE-553.pdf.

Table 1. Comparison of regulation by government-sponsored reinsurance

| | French CCR | Japanese JERS | Turkish TCIP |
|---|-------------------|----------------------|---------------------|
| Loss-sensitive premiums | Partially | No | Yes |
| The duty of utmost good faith | Yes | Yes | Probably |
| Providing risk management services | Not clear | Not clear | Yes |
| Indirect regulation of insureds | No | Yes | No |

This table shows that no government-sponsored reinsurance fully performs regulatory techniques. It seems that the Turkish TCIP is subject to less moral hazard than the French CCR and the Japanese JERS. TCIP cedes risks to international reinsurers following a loss-sensitive premiums approach and thus has more incentives to underwrite appropriately, such as identifying “bad risks,” enforcing building codes, and educating the public to raise their awareness to catastrophe risk. Meanwhile, international reinsurers not only helped found TCIP, but also worked as consultants to supply risk management services. The application of regulatory techniques of reinsurance helps TCIP work sustainably. For example, TCIP supplies a model solution, especially for developing and middle-income countries where rigorous catastrophe risks exist.

Different from TCIP, the French CCR and the Japanese JERS are both government-sponsored reinsurance institutions and not involved with other private reinsurance companies. Although they do not adopt loss-based premiums due to political pressures, they are better in enforcing primary insurers’ duty of utmost good faith than TCIP. CCR’s system is particularly suitable to France for several reasons. The first reason is cultural influence. In France, people value the national solidarity principle and are tolerant of cross-subsidies between different classes of risk and different regions, both of which guarantee a single-rate price for reinsurance. The second reason is social adequacy and affluence. As a developed and high-income country, the French government has more capacity to sponsor policyholders. The third reason is the moderate exposure to disasters. None of the twenty-five worst natural disasters

recorded, including earthquakes, typhoons, and tsunamis, occurred in France.¹³² In addition, during the last several decades (1970–2013), none of the natural disasters which caused the top ten insured catastrophe losses occurred in France.¹³³

Japan faces more severe catastrophe risks than France because of the frequent occurrence of earthquakes and tsunamis. The establishment of the Japanese JERS is the compromise between the government and the insurance industry: the government provides reinsurance capacity as a last resort and facilitates insurance affordability.¹³⁴ There is no doubt that JERS refuses loss-sensitive premiums but follows a general fair-value principle for price setting. Under such a situation, JERS pays more attention to monitoring primary insurers' performance of duty of utmost good faith and indirect regulation of insureds to control moral hazard and mitigate losses.

VI. EXPANDING REGULATION BY GOVERNMENT-SPONSORED CATASTROPHE REINSURANCE TO CHINA

This Article has reviewed the imperfections of private reinsurance, mainly due to the apparent shortage of reinsurance capital, especially during hard markets. Also discussed were government-sponsored reinsurance programs in France, Japan, and Turkey, which represent both high-income and middle-income countries. The focus now is to explore the possibility of expanding regulation by reinsurance to China.

A. THE ISSUE OF THE GOVERNMENT'S PROVIDING REINSURANCE CAPACITY IN CHINA

Section IV has explained the imperfections of the private reinsurance market for catastrophe risks, but these market failures are not sufficient to justify any and all government intervention: there are many different forms of government-provided reinsurance, some of which may be ineffective (no efficiency gains achieved) or even detrimental (causing efficiency losses).¹³⁵ One popular approach to government intervention is

¹³² Josef, *25 Worst Natural Disasters Ever Recorded*, LIST 25 (Aug. 26, 2013), <http://list25.com/25-worst-natural-disasters-recorded/5/>.

¹³³ *Natural Catastrophes and Man-Made Disasters in 2013: Large Losses from Floods and Hail; Haiyan Hits the Philippines*, SWISS RE 5 (2014), http://institute.swissre.com/research/overview/sigma/1_2014.html.

¹³⁴ Takeda, *supra* note 110.

¹³⁵ David Cummins & Olivier Mahul, *Catastrophe Risk Financing in Developing*

to provide a government bailout to victims, including ad hoc direct payment and establishing compensation funds. This type of ex-post bailout is known as the Whole-Nation System and generally seen as problematic.¹³⁶ Another popular approach to government intervention is government-provided insurance. Compared with ex-post government bailouts, this type of government intervention looks more attractive, since an ex-ante insurance approach could accumulate reserves and may provide incentives to mitigate losses before disasters if associated with risk-based premiums. However, this type of government intervention is also generally seen as problematic.¹³⁷ Even for China, where private catastrophe insurance has not yet developed, the government should facilitate private insurance rather than provide government insurance. The Chinese government could adopt a reinsurance regime for catastrophes or provide reinsurance capacity as a last resort. Such arrangements and intervention provide considerable incentive for primary insurers to control moral hazard and mitigate losses associated with catastrophic disasters.

Right now, China has begun to stimulate the development of catastrophe insurance to complement government action in addressing catastrophe risks. The government's provision of reinsurance capacity would also be a response to the concern and demand of private insurers and reinsurers.

The current insurance industry has few incentives to underwrite catastrophe risks partly due to scarce insurance and reinsurance capacity. In 2013, the Third Plenary Session of the Eighteenth Communist Party of China Central Committee promulgated the "Decision of the Central

Countries: Principles for Public Intervention, THE WORLD BANK 76 (2009), <http://siteresources.worldbank.org/FINANCIALSECTOR/Resources/CATRISKbook.pdf>; see also W. Neil Adger, Nigel Arnell, & Emma Tompkins, *Successful adaptation to climate change across scales*, 15(2) *Global Environmental Change* 85 (2005).

¹³⁶ Simply speaking, the problems include undercutting potential victims' incentives for risk prevention and loss mitigation; posing a heavy fiscal burden for the government and may cause negative distributional effects; leading to political inefficiencies and etc.

¹³⁷ For example, government-provided insurance always delivers a subsidy that private insurance does not give and inflicts two distortions: (1) regressive redistribution favoring affluent policyholders; and (2) inefficient investment in residential property by locating too many assets in vulnerable areas. Some scholars have reviewed and examined two government-provided insurance programs: (1) the National Flood Insurance Program; and (2) Florida's state owned Citizens Insurance, and found that both perceptions of government-provided insurance performance along two normative metrics: fairness and efficiency, are wrong. See Omri Ben-Shahar & Kyle Logue, *The Perverse Effects of Subsidized Weather Insurance*, 68 *STAN. L. REV.* 571 (2016).

Committee of the Communist Party of China on Some Major Issues concerning Comprehensively Deepening the Reform,” which expressly stated that “we will establish an insurance system for catastrophe risks.” In 2014, catastrophe insurance program trials were launched 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, known to be prone to earthquakes.¹³⁸ However, private catastrophe insurance is one of the least developed lines in China. For example, after the 2008 Great Sichuan Earthquake, only 0.3 percent of the total losses were covered by insurance companies.¹³⁹ Private insurers do not have the capital to fully cover catastrophe losses. The total capital of China’s property insurance companies is much lower than the total amount of losses caused by natural disasters. Table 2 shows the existence of this big gap. Moreover, the China Insurance Regulatory Commission has implemented China’s Risk-Orientated Solvency System as of 2015.¹⁴⁰ The new solvency regime requires insurers, like the Solvency II Directive in the European Union, to hold sufficient capital in their reserves, especially the capital for catastrophe risks that they are facing.¹⁴¹ In order to underwrite catastrophe risks, insurers have an increasing demand for more financial capacity and share a significant portion of the insured losses with reinsurers.

¹³⁸ *China says testing catastrophe insurance system*, REUTERS (Aug. 20, 2014), <http://www.businessinsurance.com/article/20140820/NEWS04/140829990?AllowView=VDI3UXk1T3hDUFNCbkJiYkY1TDJaRUt0ajBRV0ErOVVHUT09#>.

¹³⁹ *Establishing catastrophe insurance system faces acceleration*, CHINA YOUTH DAILY (March 14, 2011), http://zqb.cyol.com/html/2011-03/14/nw.D110000zgqnb_20110314_1-05.htm?div=-1.

¹⁴⁰ Wenhui Chen, *C-ROSS under the Market-oriented Reform and Economy Globalization*, SWISS RE (2014), http://media.swissre.com/documents/CROSS_under_the_market_ChenWenhui_Dec15.pdf.

¹⁴¹ *Id.*

Table 2. Capital of main Chinese property insurers compared to natural disaster losses (billions of US \$)

| | 2007 | 2008 | 2009 | 2010 |
|-------------------------------------|------|-------|------|------|
| Net capital of main insurers | 5.5 | 5.1 | 6.9 | 9.0 |
| Natural disaster losses | 38.1 | 189.5 | 40.1 | 86.1 |

(Source: Yearbook of China Insurance [2008–2011])

Reinsurance is an important potential complement to expanding primary insurers' capacity to underwrite risks. However, reinsurance currently does not provide strong support for catastrophe insurance in China. At present, the China Reinsurance (Group) Corporation (its predecessor, the People's Insurance Company of China Reinsurance, was created in 1996) is the only domestic reinsurer in China, with consolidated total assets of around \$30 billion and net assets of \$8.6 billion.¹⁴² Its capital is much lower than the annual losses caused by natural disasters. Although China's reinsurance market has become open to foreign reinsurance companies after China's entry into the World Trade Organization, only a few reinsurance companies, such as Swiss Re and Munich Re, have established business operations in China, and they are only in the initial stages of reinsuring risks. By 2013, there were only eight foreign reinsurers who had registered branches in China.¹⁴³ When underwriting catastrophe risks, domestic reinsurers will strongly demand government sponsorship, which could provide the government with deep credit capacity.

¹⁴² China Re, *Annual Report 2014* (2014) <http://www.chinare.com.cn/zhjt/resource/cms/2015/08/2015082709085075513.pdf>.

¹⁴³ CPCRC, *Overview of Chinese Reinsurance Market* (May 20, 2013), https://www.casact.org/education/spring/2013/handouts%5CPaper_1680_handout_962_0.pdf.

B. EFFECTIVENESS OF REGULATION BY CATASTROPHE REINSURANCE

There is little doubt that the government should provide reinsurance capacity as a last resort to catastrophe risk management in China. What is less clear is how to apply the proper regulatory techniques, as discussed in sections III and V. Clearly, catastrophe reinsurance is closely associated with the operation of primary insurance. As mentioned above, in 2014, China launched its first catastrophe insurance pilot in Shenzhen (Shenzhen Model). Therefore, the possibility and feasibility of regulation by reinsurance in China will be explored through the examination of its regulatory techniques in the Shenzhen Model.

Shenzhen was selected for the pilot because it has both major exposure to catastrophe threats¹⁴⁴ and a large number of valuable assets.¹⁴⁵ The catastrophe insurance framework of the Shenzhen Model includes three different layers: the first layer is the government catastrophe insurance assistance, which is bought by the Shenzhen municipal government, with the beneficiaries being all residents of Shenzhen City; the second layer is a catastrophe fund mainly sponsored by the Shenzhen government and social donations; and the third layer is commercial catastrophe insurance.¹⁴⁶ The first two layers of the Shenzhen Model represent the social insurance protection. According to the arrangement in the first layer, the Shenzhen city government buys catastrophe insurance products from the People's Insurance Company of China (PICC), Shenzhen branch.¹⁴⁷ It has a cap of RMB 2.5 billion with individual claim payments

¹⁴⁴ Frequently occurring disasters in Shenzhen include, but are not limited to, heavy winds (extending to whole gale, strong gale, and fresh gale), rainstorms, lightning strikes, floods, waterlogging, tornados, typhoons, tsunamis, hail, landslides, mudslides, cliff fall, land subsidence, squall lines, and earthquakes of more than 4.5 magnitude. See ICC, *Catastrophe Insurance Framework of Shenzhen City* (2015), <http://wenku.baidu.com/link?url=oLT1RmQ3BXgfW49ETc-Drhv6S1pOb8dOA5E3YOVZgCAkJrTD-aiBaF1doiXOq9Xsb1rLoty4IP-b1dPBKzZY2eiNgZex52GfzpdheyZEIt>.

¹⁴⁵ Shenzhen is a megacity with approximately 15 million residents. It is China's first and one of the most successful Special Economic Zones with its GDP totaled \$260.48 billion in 2014. See Yisha Hou, *Promoting the Construction of Shenzhen Catastrophe Insurance System*, 25 *DISASTER REDUCTION IN CHINA* 42, 42-45 (2015).

¹⁴⁶ *China says testing catastrophe insurance system*, *supra* note 138.

¹⁴⁷ The individuals receiving coverage under the Shenzhen model do not pay upfront for any losses through deductibles. See Anastasia Telesetsky, *Climate Change Insurance and Disasters: Is the Shenzhen Parametric Social Insurance a*

of RMB 100,000, and the payments are only available for bodily injury and death, but not for property damage.¹⁴⁸ According to the arrangement in the second layer, the Shenzhen city government has committed to providing RMB 36 million of funds annually to support the first layer. The third layer is related to private insurance and policies that could cover property damages. In the conception of the Shenzhen Model, reinsurers like the China Re, Swiss Re, and Taiping Re were involved. Therefore, reinsurance could and should play its role to control moral hazard of primary insurers and mitigate losses through relevant regulatory techniques.

Loss-Sensitive Premiums. In the first layer of the Shenzhen Model, the government buys insurance products from insurance companies (e.g., PICC, Shenzhen branch) rather than acting as a reinsurer. PICC cedes a large portion of underwriting to Swiss Re, China Re, and Taiping Re, according to the quota share treaties.¹⁴⁹ These treaties provide loss-sensitive premiums for PICC. Following loss-sensitive premiums, primary insurers have incentives to control moral hazard and mitigate losses. PICC has worked in tandem with experts, insureds, and other stakeholders to identify the technical and economic parameters of catastrophe risks and develop system-wide technologies of loss prevention. For example, PICC extracts 5 percent of the premium to organize disaster research, disaster prevention, disaster emergency relief drills, and disaster emergency advertising; submits to the government a quarterly report of current disaster and claims payments and an annual report of disaster risk management; offers advice on risk prevention, emergency management, and disaster relief to the municipal government; and establishes and operates a disaster data base for disaster analysis and prevention.¹⁵⁰ Furthermore, loss-sensitive premiums also induce primary insurers to regulate policyholder's behavior for loss mitigation. PICC offers the Shenzhen government a discounted premium for taking cost-effective mitigation measures. For example, PICC provides that if the annual loss ratio (actual payment amount / total premium) is less than 10 percent, then the premium the following year will be discounted by 10 percent; if the loss

Model for Adaptation?, 43(2) B.C. ENVTL. AFF. L. REV. 485 (May 31, 2016).

¹⁴⁸ Martin Li & Yin Ran, *SZ launches 1st disaster insurance*, SHENZHEN DAILY (July 17, 2014), http://szdaily.sznews.com/html/2014-07/10/content_2936724.htm.

¹⁴⁹ *China Re, Swiss Re, and Taiping Re Underwrite the Shenzhen Catastrophe Reinsurance Policies*, 21ST CENTURY BUS. HERALD (July 6, 2014), http://xw.sinoins.com/2014-07/16/content_121575.htm.

¹⁵⁰ PICC, *Catastrophe Insurance Framework of Shenzhen City* (2015), <http://wenku.baidu.com/link?url=oLT1RmQ3BXgfW49ETc-Drhv6S1pOb8dOA5E3YOVZgCAkJrTD-aiBaF1doiXOq9Xsb1rLoty4IP-b1dPBKzZY2eiNgZex52GfzpdheyzEIt3>.

ratio is less than 10 percent in two consecutive years, the third year's premium will be discounted by 20 percent; if the loss ratio is less than 10 percent in three consecutive years, the fourth year's premium will be discounted by 30 percent.¹⁵¹

In the third layer of the Shenzhen Model, the PingAn Insurance Company starts to design and sell relative catastrophe insurance products to the residents of Shenzhen.¹⁵² There is no doubt that commercial primary insurers, like PingAn Insurance Company, also have strong incentives to transfer catastrophe risks to reinsurers. The form of government sponsorship has not yet been decided in the Shenzhen Model. From the perspective of control of moral hazard, the approach of TCIP might be a good choice: the government only provides contingent liquidity support when the payments of claims exceed insurers' capacity. If China follows the model of CCR or JERS, political pressure or other reasons would not prevent it from repeating their mistakes in subsidizing premiums.

The Duty of Utmost Good Faith. According to the quota share treaty between insurers and reinsurers, it could contribute to PICC's performance of the duty of utmost good faith, since PICC has to retain some portion of the risks itself. In contrast, the typical long-term relationship mechanism between insurers and reinsurers, which is closely associated with utmost good faith may not be workable in the Shenzhen Model. The current Shenzhen Model is a temporary trial project and lacks legislative provisions.¹⁵³ Without explicit legislative provisions, the prospect of the Shenzhen Model is quite uncertain. The Shenzhen municipal government may cease to buy catastrophe insurance policies in future years. If the government does not buy insurance, there is no opportunity for a long-term relationship between PICC and reinsurers.

Providing Risk Management Services. Like TCIP, reinsurers, especially international reinsurers like Swiss Re and Munich Re, play an important role as consultants to provide risk management services in the conception of the Shenzhen Model. For example, Swiss Re initiated a Parametric Insurance Solutions for Disaster Relief System Reform research program in 2013 as a sponsor for the China Development and Research Foundation.¹⁵⁴ This research program helps Swiss Re become a technical advisor and a leading reinsurer for the Shenzhen Model.¹⁵⁵

¹⁵¹ *Id.*

¹⁵² Yisha Hou, *supra* note 145.

¹⁵³ Shi Xing, *Inspirations of Shenzhen catastrophe insurance pilot revelation*, 21ST CENTURY BUS. HERALD (Oct. 11, 2014), <http://insurance.hexun.com/2014-10-11/169210867.html>.

¹⁵⁴ *Swiss Re Works with Government Bodies in Mitigating Natural Catastrophe Risks in China*, SWISS RE (Aug. 13, 2014), <http://www.swissre.com/>

VII. CONCLUSION

Government-sponsored reinsurance can not only support failing catastrophe insurance due to the deep credit capacity of the government. Considered the corollary of the regulation-by-insurance idea,¹⁵⁶ as the title of this Article suggests, government-sponsored reinsurance can also regulate primary insurers' behaviors in risk mitigation and risk management through reinsurers' regulatory techniques.

Currently, affected parties of natural disasters, especially the pilot catastrophe insurers, are demanding government sponsorship of their catastrophe losses in China. Considering the reform of the Whole-Nation System, there is a pressing need for the Chinese government to provide reinsurance capacity as the new government-intervention approach. Moreover, regardless of which type of government intervention the Chinese government adopts, it is necessary to exert the role of reinsurance in regulating primary insurers through reinsurance regulatory techniques.

china/Swiss_Re_works_with_government_bodies_in_mitigating_natural_catastrophe_risks_in_China.html.

¹⁵⁵ Liu Ailin, *Risks of the First Catastrophe Insurance Policy Are Ceded to China Re, Swiss Re and CPIC Re*, 21ST CENTURY BUS. HERALD (July 16, 2014), <http://finance.sina.com.cn/money/insurance/bxdt/20140716/025719714880.shtml>.

¹⁵⁶ Abramovsky, *supra* note 4 (“Just as insurance is often viewed as having a regulatory effect on insured industries, so too should reinsurance be considered as having a regulatory effect on its reinsureds.”).