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Compensation for Victims of Disasters. A Comparative Law and Economic Perspective

Citation for published version (APA):

He, Q., & Faure, M. G. (2021). Compensation for Victims of Disasters. A Comparative Law and Economic Perspective. *European Journal of Law Reform*, *23*(2), 222-241. https://doi.org/10.5553/EJLR/138723702021023002004

Document status and date:
Published: 01/01/2021

DOI:
10.5553/EJLR/138723702021023002004

Document Version:
Publisher's PDF, also known as Version of record

Document license:
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Download date: 28 Nov. 2021

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DOI: 10.5553/EJLR/138723702021023002004

Compensation for Victims of Disasters

A Comparative Law and Economic Perspective

Qihao He en *Michael Faure*

Suggested citation
Qihao He and Michael Faure, 'Compensation for Victims of Disasters', (2021) European Journal of Law Reform 222-241

A Introduction

The international community is facing many challenges under extreme conditions. Taking a look at the archives of the Minerva Center for the Rule of Law under Extreme Conditions, it shows the increasing frequency and severity of a broad range of disasters.[1] For example, just in the past year (2018), over 800 people had been confirmed killed by a deadly 7.5-magnitude earthquake and tsunami in eastern Indonesia; and a large-scale flooding caused by Hurricane Florence hit Cape Verde and Bermuda, and the United States badly.[2] Such disaster stories are repeated and updated in the archives day after day. Given the prediction that disasters will become more frequent, more intense and more costly in the future,[3] there is an urgent need for the international community to engage in disaster risk management and to facilitate public and private mechanisms to compensate victims.

Disaster management and compensation are central on the current public and political agendas. The 2001 9/11 terrorism attack and the 2005 Hurricane Katrina in the United States,[4] the 2002 Elbe flood in Europe[5] and the 2008 Great Sichuan Earthquake in China[6] are typical events nurturing the active political discourse. To respond to the question whether and how it is feasible to compensate disaster victims and to control the costs of such disasters, the legal system could play an important role in governing a broad range of disasters in the rule of law societies.[7]

In general, in the law and economics literature, four types of legislative reactions to disasters are distinguished.[8] The first one is where many governments do nothing structurally, but the victims generally rely on liability rules of tort law and social security already in place. The second one is government ad hoc charity or funds with fiscal allocation paid by the taxpayer's money. The third one is the insurance coverage (usually first-party insurance) for victims. The last one is a public-private partnership ('PPP'), whereby the government facilitates private insurance and/or acts as reinsurer to support private insurance.

These solutions are quite diverging, and differ among many different legal regimes. For example, France introduced insurance for disaster coverage in 1982, whilst a government disaster fund still exists in Austria. Based on the current discussion in the law and economic literature, this article tries to explore the optimal compensation mechanism from a *timing* framework. Corresponding to a repetitive circle of disaster management as *prevention – response – recovery*,[9] we assess the *ex ante* (before the disaster occurs), *during* (emergency response during a disaster) and *ex post* (after the disaster) compensation mechanisms.

Ex ante is often regarded as the best way of victim protection and compensation, since it could reduce the damages caused by disasters and may even make compensation unnecessary.[10] Insurance is often regarded as the typical *ex ante* mechanism. Disaster

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insurance transforms *ex post* liability and damages into *ex ante* costs (premiums),[11] and could contribute to disaster prevention and mitigation through, e.g. providing incentives for potential victims to escape from risk exposure.[12]
During efforts are carried out when a state of emergency is declared. Emergency relief is popular practice as *during* mechanism. It is often supplied by the government in the immediate aftermath of a disaster, such as providing shelter, food, medical assistance and direct payment to victims.[13] This type of government intervention has a legitimate justification due to its public good nature, and few private parties have incentives to take such measures.[14]
Ex post happens after the state of emergency is over, and its goal is to compensate victims' personal and property damages and return the conditions to those had the disaster never occurred.[15] A government fund and recovery programme (also called charity by government) is a well-known *ex post* mechanism for disaster victims. Besides these government-provided compensation programmes, the liability rule of tort law is also considered as an incentive-based *ex post* mechanism.[16] However, liability rules can basically only apply in cases of technological disasters where a liable tortfeasor can be identified.[17] Where no tortfeasor is at hand in the case of natural disasters, victims often turn to government for compensation eventually. Correspondingly, politicians often participate in a race to provide *ex post* funds and recovery due to huge political benefits.[18]
According to the law and economic literature, government compensation is criticized for leading to an oversupply *ex post* and undersupply (investments in prevention) *ex ante*.[19] There is a developing consensus that under particular conditions, *ex ante* insurance is a preferred compensation mechanism,[20] and *ex post* compensation could be substituted by less costly *ex ante* measures.[21] Most of the preventive measures aiming at disaster risk reduction can obviously be taken by the government. The government can, e.g. build dikes and organize a system of levies in view of an effective water management after a hurricane. But potential victims can also take preventive measures. They can, first of all, take a siting decision in an area which is not prone to flooding; and within the dwellings, measures can be taken, e.g. to put electrical equipment and valuables in the attic, rather than in the cellar. Since the government intervention can be divided between the *during* efforts and the *ex post* efforts, government efforts should, in fact, focus on both. Emergency relief by the government has advantages as that relief has a public good character and will usually not be provided by individuals. In addition, the government can support private *ex ante* insurance by acting as reinsurer of last resort, thus facilitating private disaster insurance.
Following a comparative law and economic perspective, where the idea is to search for victim compensation at the lowest cost and at the same time provide incentives for disaster risk reduction,[22] our analysis indicates how a (combined) form of compensation mechanism could supply efficient incentives for prevention and mitigation[23] and be provided at the lowest costs and thus realize welfare maximization. The remainder of this article is set up as follows. After this introduction (Section A), Section B describes the evolution of our understanding on disasters and introduces principles of fair and efficient compensation. Section C explains why the government intervenes in disaster compensation and how it can intervene fairly and efficiently. A distinction is drawn between the *during* efforts (emergency relief) and *ex post* efforts (ad hoc recovery and fund). Section D argues that where the government cannot provide efficient compensation *ex post*, insurance may do so *ex ante*. Then, in the next Section (Section E), as an optimal approach, the structure and the role of the PPP are discussed. These discussions include whether government intervention is needed to facilitate insurance work adequately, and what is the role for both the government and private insurance. Section F brings the article to a close with a few concluding remarks.

B Understanding Disasters and the Principles of Victim Compensation

I The Understanding on Disasters

Before discussing how to manage disaster risk and how to compensate victims, it is necessary to address the question what a disaster is, since which mechanism will be the optimal depends to some extent on the nature of the disaster.[24]
The contemporary understanding of the disaster moves to 'acts of the social (humankind)'
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and believes the cause of disaster is neither God nor nature (at least not alone).[25] Two sub-conceptions 'risk' and 'vulnerability' are tied to the understanding of disaster as an act of the social.[26] The question how to address disaster then becomes how to control the risk and reduce the vulnerability to disasters. Victims of disasters no longer accept the old adagium (proverb) 'the law lies where it falls', but argue the social system's inability to manage disasters. According to the paradigm theory,[27] our understanding of disasters evolved from the first disaster-paradigm 'acts of God', to the second 'acts of nature', and to the current 'acts of the social (humankind)'.[28]

A common distinction of disasters is made among natural disasters (e.g. earthquakes, floods and tsunamis), man-made disasters (e.g. wars, terrorism and explosions) and socioeconomic disasters (e.g. financial crisis and severe sociopolitical fragmentation). However, such distinctions become less important since there are 'many causes but one clear truth: disasters are not natural'.[29] Whilst the causes of disasters may be natural, their outcome, or at least the severity of that outcome, are not necessarily so. Under this circumstance, it is reasonable to predict that victims will claim compensation, especially when the harm is large and hits thousands of victims. Some politicians will not be able to resist the temptation of compensating the victims, due to the large political rewards that compensation provides.[30]

II Guiding Principles of Compensation

Since there are different types of mechanism to compensate disaster victims, how to assess, evaluate and compare these mechanisms is a core issue. The literature provides valuable insights to develop a few guiding principles.

The first principle is that a victim compensation programme should accord with efficiency standards. These efficiency standards include, inter alia, the following: first, the compensation mechanism should provide potential victims with incentives to prevent damages and reduce losses since prevention is always more important than cure.[31] Second, the compensation mechanism should apply disaster risk differentiation, which prevents shifting of risks and losses from a collectivity, and make those who contribute larger to the risk pay more.[32] Risk differentiation relates, in the first place, to tortfeasors (e.g. an operator of a nuclear facility) who expose individuals and society at risk. But risk differentiation can also apply to the victims and their respective vulnerability to the disaster. If a compensation programme (e.g. for flooding) applies risk differentiation, it will provide incentives for prevention, risk reduction and mitigation of damage.[33] Third, the compensation mechanism should be operated at the lowest administrative cost.[34] Fourth, the compensation programme should ensure timely payments to victims since the delays in paying can increase the suffering of victims.[35]

Of course, there may be conflicts in trying to achieve this efficiency principle, especially in cases where it would be impossible for potential victims to invest in disaster risk reduction. For example, potential victims of flooding in Bangladesh could hardly be blamed for living in a flood-prone area, as they may simply have no other choice in practice.[36] In other cases, some low-income families may be seriously exposed to, e.g. hurricane risks and would thus (in view of efficient risk differentiation) have to pay relatively high insurance premiums which may be unaffordable to them. Some solutions have been suggested, e.g. providing vouchers to low-income families to pay the insurance premiums on the condition that they would take measures aiming at disaster risk reduction.[37]

C During and Ex Post Government-Provided Victim Compensation Mechanisms

I Why Government Compensation for Victims?

Why government should consider compensating victims is a preliminary question that has to be addressed before we discuss what kind of government mechanisms should be used. It has been argued that many have the normative belief that providing disaster compensation is one of the principal functions of government.[38] Disasters often lead to a complete disruption of society. For example, as a result of a big nuclear blast or a devastating earthquake, half of a city might not be used anymore. Many victims are

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homeless, and the banks have mortgages that are worth nothing anymore. The potential side effects for the whole society (including the economy and financial system) can be huge. Government compensation can fulfill an important function to bring victims back to some extent of normality.[39] Moreover, leaving victims without relief and compensation is incompatible with notions of solidarity, especially in the European Union (EU) welfare states.[40] Third, government compensation for victims is providing public goods in case of disasters. Disasters are different from an accident suffered by an individual victim. Dealing with large-scale damage losses is a typical public good that is not sufficiently provided through private actors. Compared with private actors, the government could channel capital quickly after catastrophes since it can raise money by issuing debt or government bonds, or tax (also a form of cross entire population risk diversification), or diversifying the risks to future generations (a form of cross time diversification).[41] By providing compensation to thousands of victims, it could help restore public trust in the government.[42]

Although the significant losses and damages caused by disasters leading to serious political and economic instability justify and require an efficient compensation system, government compensation for victims of disasters is principally debated. Moreover, questions also arise concerning the effectiveness of compensation in specific cases. Generally, the government prefers to provide compensation *ex post* rather than *ex ante* for political visibility due to news coverage.[43] Empirical research has shown that half of all disaster compensation funding by the U.S. Federal Emergency Management Agency (FEMA) is driven by politics rather than by altruism.[44] That, therefore, raises the question why particular victims, more particularly those suffering from disasters, should receive a preferential treatment compared to others. This may violate the equality principle. Kaplow suggested that what the government should worry about is the incentives for disaster prevention and deterrence,[45] rather than redistributing taxpayers' money to victims of disasters.

This is why government compensation for disaster victims has a poor reputation, and is generally criticized in the law and economic literature.[46] However, government compensation mechanism takes different forms in different stages of disaster management. We try to carve out a broader scope for government compensation and make a distinction between *during* relief efforts (at time 0, meaning during the disaster strikes and the immediate aftermath) and *ex post* recovery efforts (at time +1, meaning the reasonable time after the disaster).[47] The general critics of government intervention apply to *ex post* recovery, but not to the *during* relief efforts. The following sub-sections expand the analysis of *during* versus *ex post* efforts and explore their fundamental differences.

II During Government Relief

1. Pro

The *during* government relief has received less attention than traditionally *ex post* recovery, which is in the law and economics literature often contrasted with *ex ante* mechanisms.[48] *During* government relief refers to an immediate and effective response after a disaster, and consists of medical assistance, food, money and other basic living necessities.[49] In contrast to *ex post* recovery (at time +1), the *during* government relief could be basically regarded as the emergency relief (at time 0). Like the 'golden hour' in emergency medical services, there is also the so-called first 72 hours after a disaster.[50] The first 72 hours are critical, since, e.g. in the case of an earthquake, the chance of finding survivors dramatically decreases after that period.[51] Therefore, there are strong reasons for the *during* government relief.

First, *during* government relief has a public good character since thousands of victims need rapid compensation after the unannounced strikes. Since private actors may have no incentives and lack the capacity to take emergency measures due to the large scale and the suddenness of relief activities, the government may be the best placed to do so.[52] Second, the government has the capacity to provide relief through the mobilization of national coordinated efforts and the pooling of significant resources.[53] Third, relief is potentially damage-limiting and has a positive *ex post* effect. It reduces the immediate damages that will have to be paid for either by the victim or through the government recovery efforts. As

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we discussed previously, the government prefers to oversupply recovery due to the news-sensitive effect of disaster. The *during* relief could reduce recovery costs. It also alleviates, to some extent, the dilution of *ex ante* prevention incentives since fewer funds will be drawn to *ex post* recovery.[54] Although *during* relief is therefore generally preferred, at least compared to ex post recovery, difficulties may remain in judging the effectiveness of the *during* relief. The following case study concerning Hurricane Katrina can illustrate that.

2. A Case Study of During Government Relief

Of course, there is sometimes also criticism on the way in which the government provides *during* relief in particular cases. Relief is, in some cases, not provided in a timely manner or not in an effective way. Take the example of the failure of FEMA's performance *during* Hurricane Katrina.[55] This is generally not considered the failure of government relief as such, but rather an example of a failure concerning leadership with respect to government relief.[56] The contrary example – the success of the Chinese Government *during* the 2008 Sichuan Earthquake has shown the positive role of *during* relief.

In 2008, the earthquake, magnitude 8.0, struck the Sichuan Province in China. The losses exceeded $ 100 billion and it caused 69,277 deaths.[57] The scale and suddenness of disaster damages demand immense resources and funds in a short time. The central government appropriated $ 83 million for relief efforts on the night that the earthquake occurred; within one week, the central government supplied more than $ 400 million in earthquake relief;[58] within four months, the government had created an emergency disaster relief fund in the amount of about $ 11 billion.[59]

China's *during* government relief efforts can be categorized into two aspects: (1) emergency response, including rescuing victims, providing medical treatment to injured people, providing food and shelter for victims, etc. and (2) direct payment to victims.[60] For per person, the government supplied a three-month temporary living subsidy, which was approximately RMB 10 yuan (about US $ 2 in 2008) plus 0.5 kilogram of bread every day to earthquake-affected people; for per family, government provided each victim's family with a lump sum payment of RMB 5,000 yuan (about US $ 900 in 2008).[61] The government offered additional compensation to the injured, orphans, lonely elderly and the handicapped with RMB 600 yuan (about US $ 100 in 2008) per month. Moreover, for the seriously injured, the government provided RMB 28,000 (about US $ 4,600 in 2008) medical subsidies; for the minor wounded, their medical treatment was free of charge (paid by the government).[62]

According to three surveys conducted after the earthquake, *during* government relief has been viewed as successful by the public.[63] It is regarded as both 'close and timely'.[64] The reasons why the *during* government relief was considered to be effective in China are the following. First, the Chinese government has a relatively strong financial capability to undertake disaster relief since China has grown to be the second largest economy in the world.[65] Second, the Chinese central government could require some provinces which have stronger economic power to donate 1% of their fiscal revenue from the preceding year to assist disaster-affected areas.[66] This is a type of an intergovernmental national 'pooling' of the catastrophe risk. Third, the Chinese government could mobilize military power for emergency disaster relief.[67] Fourth, the Chinese government enjoys high levels of trust from residents in disaster areas since a lack of trust would undermine the credibility and stability of the government relief, and lead to inefficiency, unrest, or even failure.[68] Of course, one has to be relativistic about the fact that the public praises the Chinese government for the effectiveness of the disaster relief. They were also largely the beneficiaries of this *during* relief, so their opinion may be biased. However, generally *during* relief does not create the same type of moral hazard as *ex post* recovery,[69] so the most important question is whether the funds do indeed effectively reach the targeted goals.

III Ex Post Government Recovery

Ex post government recovery often takes two different forms, either through ad hoc charity or via a structural fund. These *ex pos*t programs can be found in many countries. Countries like Germany, Italy, the Netherlands and Sweden usually provide ad hoc

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compensation to victims, whilst Austria and Belgium have a structural compensation fund.[70] These two solutions share many similarities, and the major distinction is whether the compensation decision is made case by case, depending on each disaster's damages.[71] Although the government in different jurisdictions provides generous *ex post* recovery due to political considerations in practice,[72] the critics to and disadvantages of this *ex post* government recovery are widely discussed.

First, *ex post* government recovery provides negative *ex ante* incentives for prevention, and result in a less-safe environment and higher death tolls.[73] Take, e.g. Hurricane Katrina. On the one hand, various government authorities participated in the race to provide recovery over $ 100 million *ex post;*[74] however, there was a lack of investment in prevention and a lack of emergency planning prior to the disaster.[75] On the other hand, it causes the charity hazard of victims, which induces the dilemma that more government recovery may cause more disaster losses because people are less likely to take precaution and prevention measures.[76] Helpless and uninsured victims are more vulnerable to disasters and, therefore, require more *ex post* aid, which, in turn, makes the disaster more salient and politicians more eager to stage a rescue.[77]

Second, *ex post* government recovery is increasingly insufficient for the growing needs and may not be fit for purpose, due to the pressure on aid budgets and the delay in the disbursement.[78] Government funding is usually disbursed annually, which creates a growing mismatch between needs and financing. Empirical research also found that government aid flows are not always associated with victims' needs.[79]

Third, political-driven recovery puts too much weight on the news-sensitive problems and hence diverts resources away from humanitarian compensation.[80] For instance, an empirical study shows a correlation between elections and realized *ex post* government payment: "disasters occurring in election years attract more ex post funding relative to disasters in other years".[81] An oversupply of *ex post* recovery is nearly unavoidable since it allocates large political rewards to politicians.[82] This obviously violates the equality principle since victims who suffer disaster in the election year are luckier than victims of disasters occurring in other years.[83]

D Ex ante Insurance Mechanism for Victim Compensation

The previous section showed that *ex post* government compensation mechanisms dilute residents' prevention incentives and create the mentioned charity hazard. Conversely, an *ex ante* insurance mechanism could provide positive incentives to victims for disaster reduction. However, potential victims' reliance on government prevents them from purchasing insurance.[84] Just as Gollier has argued, 'solidarity kills market insurance'.[85] An empirical research on crop insurance in the Netherlands has shown that due to government disaster compensation, insureds' incentive to purchase insurance would be severely undermined.[86]

However, the role of insurance in compensating victims has been emphasized in recent years. Take Belgium, e.g. which once provided compensation through a structured fund to victims. Since 2003, Belgium has moved to a system of mandatory insurance, substantially reducing the role of the compensation fund in compensating victims.[87] Following Belgium and France's comprehensive disaster insurance in covering disaster risks, there might be a transition moving from *ex post* government recovery to *ex ante* insurance in the Europe.[88] There is no formal EU intervention as far as the compensation for victims of disasters is concerned.[89] As a result, EU member states, in principle, decide on their own how to organize a system of compensation for disaster victims. That explains the wide variety that can be observed. However, the Belgian and French insurance system has been praised by law and economics scholars, and promoted for a much wider scale;[90] whilst in other states, like the Netherlands, the lack of a comprehensive *ex ante* insurance system is severely criticized.[91]

I Ex ante Insurance verse Ex Post Government Recovery

1. Incentives for Disaster Risk Reduction

People reacting to financial incentives is one of the basic starting points of law and economic analysis.[92] The first benchmark for the comparison and evaluation of the

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optimal mechanism is whether it is possible to provide positive incentives for disaster risk reduction and adopt preventive measures. When exposing potential victims to the financial consequences of disasters, that may affect their decisions to avoid risk and losses. Compared to *ex post* government recovery, the major advantage of *ex ante* insurance is that it could provide positive incentives for potential victims to invest in risk reduction and preventive measures.[93] Although investing in disaster risk reduction is, in principle, possible with all kinds of disasters, the possibilities for victims to reduce risk ex ante may well vary according to time and place, as was indicated above. Especially in developing countries where, e.g. a location choice in an area which is not prone to disaster risk is often simply not an option. The payment of an insurance premium before the disaster makes the insured aware of the vulnerability to the disaster. This has a positive impact on their behaviour.[94] This rationale certainly applies to natural disasters in areas that are particularly prone, e.g. to flooding or earthquakes. The situation may be different, however, with disasters that are so grave that they occur once in a lifetime. In that particular case, it may be more difficult to assume that those potential disasters could shape the behaviour of individuals or governments.

To the contrary, *ex post* government recovery fails to alert potential victims to the disaster consequences, and may thus negatively affect their decision to invest in mitigation measures. Moreover, in certain cases, due to certain public and institutional biases, preventive measures may be higher than the costs (the costs invested in the prevention of terror attacks may be higher than other death-causing risks such as car accidents or non-efficient health services).

Besides exposing potential victims to the financial consequences of disasters, it is equally important to relate the victims' financial contribution (in insurance: the premium) to the extent to which the victim is exposed to risk. In other words, risk differentiation should be applied.[95] The victims exposed to more risk should, therefore, pay a higher financial contribution (higher premium) and vice versa. This differentiation of risk can positively affect victims' incentives for prevention. *Ex ante* insurance could execute such risk differentiation before the disaster because the insured who are exposed to more risk have to pay higher premiums. Insurance in that manner contributes to risk awareness. Insurance solutions are preferred to undifferentiated lump sum payments to victims by the government. The problem with lump sum government compensation is that, in principle, individuals who posed no risk and those with high risk receive the same payments.[96] In that way, government compensation negatively affects the incentives for disaster risk reduction as well as for mitigation of damages. Since the capital of government compensation generally comes from all taxpayers, it might further violate distributional justice because the higher risk residents, such as those living in a flood-prone area, may simply freeride on all the taxpayers.[97]

2. Administrative Cost

The second benchmark is whether the compensation mechanism could be operated at the lowest administrative cost. *Ex post* government recovery is sometimes regarded as the 'catastrophic responses to catastrophic risk,'[98] due to its higher administrative cost including, but not limited to, salaries and wages paid to programme administrators, claim processors and auditors; costs related to develop claims and other forms for applying compensation; fees on communication with public; etc.[99] Compared to government, *ex ante* insurance is praised due to its advantages of lower administrative costs and higher efficiency as a result of using competitive markets.[100] Therefore, *ex post* government recovery should and could be substituted by cheaper *ex ante* insurance purchased before the disaster. Against efficient management, there is, of course, a profit that insurance companies anticipate to make as a result of covering individuals against the disaster risk. Insurance purchasers are expected to finance that profit. To some extent, those profits made by insurance companies could outweigh the higher administrative costs related to *ex post* government compensation, although, generally, private insurance companies will have better incentives for cost reduction than do governments.[101]

II The Role of Insurance for Victim Compensation and Disaster Risk Reduction

1. Moral Hazard Control

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Some may argue against *ex ante* insurance due to the problem of moral hazard. Moral hazard is the tendency of insureds from vulnerable areas to exercise less care to avoid losses than they would if insurers did not cover the losses.[102] The statement that insurance could control moral hazard seems counterintuitive. Indeed, in much of the literature, insurance is seen as antithetical to risk reduction.[103] However, compared to the government, insurance is better at controlling and reducing moral hazard through using technical tools stealthily.[104]

These technical tools, which almost all insurers use to one degree or another to control moral hazard, include risk-based pricing, contract design (e.g. limits, deductibles, copayments and exclusions), loss prevention services, etc.[105] Risk-based pricing is just the practice for the application of risk differentiation, since it offers lower premium to insureds adopting mitigation measures and higher premium to riskier insureds.[106] A deductible as a form of contract design could reduce moral hazard because it prevents potential victims from shielding themselves entirely.[107] Insurers could provide loss-prevention services due to their professional skills in risk management, such as retrofitting of houses against windstorms to induce potential victims to avoid losses.[108]

In sum, through offering effective incentives, applying technical tools, and monitoring policyholders' behaviour, *ex ante* insurance has the capacity to control moral hazard of insureds, promote policyholders' cost-effective actions and thus work as an efficient compensation mechanism.

2. Barriers to the Development of Disaster Insurance

First-party insurance has the potential to play a positive role in disaster victim compensation, but it has done relatively little so far in practice.[109] Insurers even retreated from underwriting catastrophic disasters and (partially) withdrew from such market.[110] Several barriers from both the supply side and the demand side prevent the development of disaster risk policies.

For the supply side, the barriers include increased losses of disasters, short-run profit horizon of insurers and their directors and officers, and the insurability concern of catastrophes.[111] As a result, insurers actually do not have strong incentives to provide disaster coverage.

For the demand side, many potential victims just do not purchase catastrophe insurance. Behavioural economics explains consumers' anomalies due to the intuitive thinking bias[112] and myopic loss aversion.[113] Consumers just ignore such catastrophe risk because they believe 'it will not happen to me'.[114] This attitude makes consumers underestimate the risks of being exposed in disasters and they will not purchase sufficient insurance coverage voluntarily.[115] What is worse, counting on *ex post* government recovery following disasters, as we discussed in Section C, many victims choose not to purchase insurance, which is actually a rational choice rather than a bias.[116] In other words, the insufficient demand for insurance may result from the *ex post* generosity of the government.[117]

E Public-Private Partnership for Victim Compensation

By discussing government-provided compensation mechanisms, we noticed a mixed role of government intervention. On the one hand, *during* government relief corresponds, as was shown above in Section C II, with principles of efficient compensation. On the other hand, *ex post* government recovery provides, as shown in Section C III, negative incentives for disaster risk reduction.[118] In Section D, it was concluded that *ex ante* insurance can, on the one hand, provide incentives for disaster risk reduction. On the other hand, disaster insurance may not emerge since insurers may be reluctant to provide cover and individuals exposed to risk may not realize that their situation could be improved through insurance. This justifies an intervention of the government to support disaster insurance. Potential victims lack sufficient demand for insurance. For some potential victims, it is the rational response since they count on *ex post* government recovery.[119] For some victims, it is irrational since they may largely underestimate the risk for low-probability losses.[120]

Therefore, a PPP, which could combine the merits of both government intervention and insurance, might be an optimal choice. Different approaches of those PPPs can be found in several countries.

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I Evaluating Different Approaches of PPP in Compensating Victims

Since there is no unified definition of PPP, this word has been used under different circumstances and carries different meanings.[121] It has shifted from being a simple technique adopted by the government to enhance infrastructure development towards being a comprehensive policy preference at the heart of governance.[122] In the field of disaster victim compensation, the attempts to develop PPPs generally can take three different forms.

Under the first approach, insurers provide disaster risk coverage and compensate victims in the case of damages, whilst the government does not intervene in either direct insurance or reinsurance. The task of the government in this first model is to take administrative measures to facilitate and guarantee the independence of insurers' operation, such as setting rules for buildings and land use and protecting the well-functioning competitive market. The old English flood insurance programme, the one that existed before the entry of the new Flood Re programme, in the United Kingdom, is a typical example. The United Kingdom's private flood insurance scheme demonstrates how a large private insurance could work, and it was considered efficient.[123] Flood Re was built on a gentleman's agreement between the insurers and the government, whereby the government agreed to invest substantially in preventive measures to reduce flood risks and the insurers from their side agreed to provide cover. The challenge facing the United Kingdom, however, was how to keep it widely available and affordable, specifically to enable high-flood-risk households to obtain it at an affordable price, which is a main concern of the new Flood Re programme.[124] In recent years, the programme has also been challenged as the insurers considered that the government did not come up to its part of the deal, i.e. too few investments would have been made in flood prevention. Currently, the UK government has reformed building regulations, ensuring that residents are required to take disaster resilience/resistance measures.[125] In this first model, the cooperation is therefore relatively loose in the sense that it is the insurers that provide cover; the government, from its side, promises to take either public measures to prevent risks or to issue regulations aiming at disaster risk reduction.

The second model seems to be the opposite of the first approach. In the second model, the government is the primary risk bearer for disaster, whilst private insurers only play an exclusively administrative role in running the programme.[126] This model has been developed within the National Flood Insurance Program (NFIP) in the United States. The NFIP was established according to the National Flood Insurance Act of 1968, in order to assume the flood risk and offer coverage for disaster prone area residents.[127] Private insurers do not assume risks, but only administer policy coverage as the agent for FEMA. Moreover, there is no reinsurance arrangement in the NFIP. If claims exceed its financial capacity, the federal government provides bailout. This approach provides little advantage over a pure government-provided compensation programme, since the private insurers have no incentives to regulate policyholders' behaviours and enhance the effectiveness of the programme.[128]

The third model seems to stand in the middle of the above two approaches, where private insurers underwrite the disaster risk like many other lines in the private market, whilst the government acts as the last resort to provide additional capacity through reinsurance or other kinds of financial guarantee. The French Caisse Centrale de Réassurance (CCR), the U.S. federal-backed terrorism insurance and Turkish Catastrophe Insurance Pool are models of this approach. Take the French CCR as an example: the insurers are responsible for underwriting primary coverage, whilst the government provides subsidized reinsurance with an unlimited guarantee and cooperates with private insurers to create prevention and mitigation plans.[129] This enables primary insurers to underwrite disaster insurance policies at affordable prices for homeowners.[130] This model is more promising than the previous two, but is not perfect either. First, government-sponsored reinsurance generally offers subsidized premiums, which partially reduces incentives for disaster risk reduction.[131] Moreover, unlike private insurers, who face competitive pressure, governments face political pressure and, therefore, often apply a weaker pricing model. Again, the pricing may not sufficiently reflect risk and, therefore, not provide sufficient incentives for disaster risk reduction.[132] This model also requires a mandatory intervention by the government. Otherwise, private insurers would not be willing to cover correlated catastrophic losses.[133]

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II Outlook and Policy Recommendations for PPP

The starting point for any recommendation is that an *ex post* compensation mechanism should always be structured in such a manner that it provides *ex ante* incentives for disaster risk reduction. The system requires 'the potential to transfer risk to the party most able to bear it –that is, the party that can best manage it or mitigate it'.[134] These starting points have two important consequences for the role of the government in compensating victims of disaster.

1. Stick to During Government Relief

Most criticism on government-provided compensation efforts that we have examined above refer to *ex post* government recovery, rather than to *during* government relief. Undoubtedly, no one should object to the government providing emergency relief, including medical treatment, food, shelter and direct payment to victims during and in the aftermath of a disaster.[135] In addition, *during* government relief contributes to deal with the affordability issue of low-income residents for financial compensation solutions. It could "assist those who cannot afford to invest protective measures,…, against catastrophic losses for risks that are considered uninsurable by the private sector alone."[136]

2. Facilitate the Ex ante Insurance

In order to promote the role of *ex ante* insurance in compensating victims, the government should facilitate to solve the supply-and-demand barriers. To solve the supply barriers, the government could act as reinsurer to help fill the 'capacity gap' of primary insurers in underwriting disasters. Government-sponsored reinsurance can support failing insurance due to 'a deep credit capacity' of the government since it could raise money effectively and quickly through tax or issuing debt or bonds after disasters.[137] To solve the demand barriers, the government should reduce and even eliminate *ex post* government recovery and help solve the problem of adverse selection of potential victims with the provision of mandatory rules (like France's mandatory comprehensive disaster insurance model[138]). Furthermore, the government should provide public goods, like levees, and set rules and codes for disaster prevention to facilitate the insurance operation. Last but not the least, the government should pay special treatment to low-income residents. For example, it may provide means-tested vouchers which could cover part of the cost of insurance, and mitigation grants and loans, to those poor residents to afford insurance whilst keeping insurance premiums reflecting risk.[139]

F Conclusion

Having started with a basic review of the evolution of disaster understanding and fundamental principles of victim compensation, we outlined and compared the government relief and recovery, insurance, PPPs in the framework of *ex ante, during*, and *ex post* timeline, to explore what kind of compensation mechanism could provide optimal incentives for disaster risk mitigation. By evaluating those mechanisms, we can observe serious limits in government-provided *ex post* recovery, and challenges in exclusive *ex ante* insurance. However, there is a remarkably dynamic partnership whereby compensation mechanisms interact in different stages of disaster management. Several recommendations are proposed on how a comprehensive PPP could be established. There are examples of legal systems that have already introduced the models we propose. In the EU, although compensation for disaster victims is often used as a political tool, European member states increasingly adopt a PPP mechanism whereby private insurance coverage is backed up with government-sponsored reinsurance. In China, the state still sticks to the praised *during* government relief, and, it gradually reduces the *ex post* government recovery by introducing *ex ante* insurance. Moreover, in the United States, especially after Hurricane Katrina, more suggestions are proposed to implement a PPP reform of the NIFP where primary insurers are responsible for underwriting flood risks and some type of federal reinsurance should be provided.[140] Our analysis and recommendations may contribute to further research on this crucial topic and to a more

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effective compensation for disaster victims which equally contributes to disaster risk reduction.

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138 Act No. 82-600 of 13 July 1982 on the Indemnification of Victims of Natural Catastrophes provides that "property insurance policies that cover damage against property are automatically and mandatorily insured against the risk of natural disasters". Although natural catastrophe disasters are 'non-insurable direct material damage,' they must be insured in the Cat.Nat System (Art. L. 125-1 *Insurance Code*).

139 Howard Kunreuther & Rosemary Lyster, *The Role of Public and Private Insurance in Reducing Losses from Extreme Weather Events and Disasters,*19, Asia Pac. J. Envtl. L., 29, 42-43, 2016.

140 *See* Kunreuther, *supra* note 127, at 741-762.

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