

# PUBLIC FINANCE AND EXTREME EVENTS

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**Abstract:** *The paper intends to review an area of the public finance that is rarely under the attention of the researchers: how the public finance reacts when an extreme event happens? First, we tried to overcome the difficulties arising from the need to clearly define the term “extreme event”. Second, we consider the public authorities intervention through public finance channels when an extreme events occurs. And, finally, we review some public-private partnership solutions to a crisis generated by an extreme event.*

Any attempt to define an „extreme event” is a little bit difficult due to the intrinsic relativity of extreme / extraordinary / exceptionally character of an event. An event could be in the same time an extreme one for one or many persons as well as an ordinary one for other persons. An event like a fire at a private home is without a doubt an extreme one for the owners and for the neighbors, but is an indifferent event for the persons that are not living in the respective area.

Nevertheless, we could affirm that an extreme event could be defined as an event that causes losses to a bigger number of persons and that has a very low frequency.

In accordance to their nature, the extreme events could be split in the following categories:

- Natural catastrophes, such as:
  - Weather extreme events (hurricanes, tornados, floods, El Nino – The Southern Ocean Oscillation, The Northern Atlantic Oscillation etc.);
  - Geological extreme events (earthquakes, volcanic eruption, tsunami or meteorite or comet collision).
- Man-made extreme events (explosions and fires, motor or railway accidents, air crashes, marine disasters, terrorist acts).

Due to their nature, extreme events, either natural or man-made catastrophes, have the capacity to deeply reveal the institutional structures of a society. Also, the economic impact of such events extends way over their geographical area of incidence.

After an extreme event happened, public authorities are in a situation in which they have to conceive, implement and finance policies as efficient as possible and focused on limiting damages and reconstructing the affected areas.

In a period prior to an extreme event, public authorities could promote prevention policies that could limit big losses. Practically, in this period, both the public authorities’ prevention decisions and the households and firms decisions affect, in the same time, the probability and the proportion of damages and human life losses determined by such an event.

Due to the random character of extreme events, the creation and implementation by the public authorities of some adequate prevention policies and some policies focused on diminishing the negative effects of such events require an adequate understanding of the statistical distribution of the extreme events and an adequate understanding of their economic and fiscal consequences. Knowing the statistical distribution of the extreme events is very useful in order assess the statistical distribution of fiscal shocks that have to be faced by the public authorities.

The extreme events statistical distribution is often tailed, in which the extreme results occur with a frequency bigger than that could be derived based on some models based on ordinary, usual, normal statistical distribution. Such a rarely seen statistical distribution is the one that characterizes the extreme events, because if we take into account all the extreme events and the ensemble of damages and losses, only a small part of these is “responsible” for a overwhelming part of damages and losses. An example in this direction is represented by the floods caused by hurricanes in the United States of America: in the last 46 years, the damages produced by only 8 extreme events account for almost 95% of the total damages recorded in this period<sup>1</sup>. Only the value of damages produced by hurricane Katrina in the state of Louisiana in 2005 exceeds the value of damages produced by all the hurricanes from the last century.

Nevertheless, due to the limitations imposed by the insufficiency of some adequate statistical datasets, not even one statistical method offers the possibility to determine with great accuracy the distribution of the probabilities for the occurrence of some extreme events.

Due to the special rarity of extreme events, the occurrence of such an event determines a stochastic shock at the public finance level that government authorities have to face. In this sense, the government could use a large variety of fiscal and financial intervention instruments, like supplementing the public funds through public loans or accumulating financial reserves that could be used in crisis situations generated by some extreme events.

A state that is confronted with the risk of an extreme event could act in different ways, like the following<sup>2</sup>:

- could wait until the extreme event is happened and then to intervene through important transfer and social grants and through the allocation of some important public funds for the reconstruction of the affected areas, that will have as an effect, at least at that moment, the reduction of not so urgent public expenditure, an increase in the taxation level and a delay of current financial obligations;

- after the occurrence of an extreme event, public authorities could undertake public loans in order to assure the necessary public funds both for the intervention aimed to reduce the negative effects generated by the extreme event and for maintaining the level and the destination of prior assignment of public expenditures, without a major increase in taxation;

- accumulation of financial reserves in the period prior to the occurrence of an extreme event, which could be used after its occurrence.

As a consequence of the possibility of risks appearance, public budget must include a reserve to cover them, but the dimension of this reserve mustn't be very high. This reserve must cover just the urgent public needs. Contrary, the allotment of the budget reserve will be subject of an intense political negotiation during public budget execution<sup>3</sup>. In many cases, the results of this negotiation do not serve the public interest because of the crowding out effect of public expenditure on private insurance.

To argue this, we will distinguish the effects of an extreme event on the public finance and we will make some considerations regarding the way in which could be affected the public expenditures and the public revenues.

The natural disasters could have important implications for public expenditures. The occurrence of an extreme event could determine some supplementary public expenditures and / or the reallocation of the financial resources that had already a destination, in order to cover the costs of the necessary repairs and to rehabilitate the public property and to give some grants to the ones

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<sup>1</sup> Wildasin D. – Disasters: Issues for State and Federal Government Finance, IFIR Working Paper no. 7, 2006.

<sup>2</sup> Idem.

<sup>3</sup> D. Dănuțiu, Considerații asupra legăturii dintre formularea politicilor economice și elaborarea bugetului public, în vol. Studii de economie. Lucrări științifice ale cadrelor didactice, vol. XXIV, Editura Universității de Vest, Timișoara, 2003, pag. 261.

that had been negatively affected by such an event. These operations could lead to the delay or even the canceling of some investments planned to be realized, could determine a quantitative and / or qualitative reduction of the public services supply and could delay a planned increase in public sector wages. It is to be noticed that any delay in the implementation of a public investment project could lead to an increase of its final cost. All these problems could be increased by the additional pressures that government authorities have to face in the aftermath of an extreme event.

Public revenues could also be affected. Extreme events could determine a reduction in public revenues because the reduction in the level of economic activity, including a possible reduction of imports and exports, which it could lead to a reduction in budgetary receipts from direct and indirect taxes. Although these losses could be compensated by some external financial aid, it is unlikely that this compensation to be an integral one. More, there is a possibility that public enterprises to suffer losses associated to the extreme event, which could in turn to raise the pressure on the public financial resources.

As a consequence, a government could face pressures induced by an increasing demand for public funds, which will be obliged to meet. Necessary supplementary public financial resources could be ensured if the government authorities accept:

- to diminish foreign currency reserves (only in the case in which these exist and are available);
- to increase internal public debt and / or external public debt;
- to increase the money supply.

However, these options for financing the supplementary public expenditures that are required due to the occurrence of an extreme event could also generate negative effects on the economy:

- financing via money creation could lead to inflation;
- public loans from the internal market create pressures regarding the increase of the interest rate, that could lead to a severe contraction of credit;
- the significant increase of the external public debt, besides it generates supplementary fiscal costs in the future, could determine an depreciation of the exchange rate, reducing the price of imports and increasing the cost of exports.

The occurrence of some extreme events could impose a continuous pressure on public finances due to the expected future governmental measures focused on prevention or reduction of their negative effects. These are just costs which the governmental authorities from countries less predisposed to natural catastrophes it is not necessary to support.

Although, there could be some positive effects materialized in economic growth, due to the high level of investments after the occurrence of an extreme event. Infrastructure rehabilitation and necessary reconstruction after such an event offers an opportunity for repairs and infrastructure improvements which, even necessary, were left aside in the past.

From the crisis management perspective, the issue at hand is to answer to an extreme event occurrence in such a manner that economic losses and negative impact on public finances to be minimized, economic reconstruction to be encouraged, poorer and vulnerable sectors of the economy to receive help according to poverty reduction strategy and reaching the long-term development objectives not to be significantly delayed.

In the last twenty years, the governmental authorities from Europe and United States of America found out that a good part of insurance and re-insurance firms retired from the market of the insurance against some extreme events occurrence. In this context, there were projected and implemented collaboration schemes between the private sector and public sector which to ensure the catastrophe risk covering (“risk pooling”), that adds to some group reinsurance arrangements and to last resort credit.

So, in this sense, the governmental authorities from the states of the world created public-private partnerships, like:

- in France – National Disaster Compensation Scheme (CATNAT);
- in the United States of America – National Flood Insurance Program, California Earthquake Authority, Florida Hurricane Catastrophe Fund, Hawaii Hurricane Relief Fund;
- in New Zealand –Earthquake Commission;
- in Japan – Japan Earthquake Reinsurance;
- in Spain – Consorcio de Compensación de Seguros;
- in United Kingdom – reinsurance pool (Pool Re) for insurances that cover the terrorism risk;
- in Turkey – reinsurance pool against catastrophes.

In the following section we will present the main elements of some of these public-private partnerships.

The American state Hawaii encountered a serious crisis of property insurance in the last two decades of the last century. The risk attached to volcanic eruptions and earthquakes became actually uninsurable due to the presence on the island Kilauea volcano which erupted in 1983 causing considerable damages and important losses for the insurance companies.

Facing this situation, the public authorities had to intervene in order to bring together private insurance companies in a pool which could nevertheless offer property insurance policies in the lava flowing area. Initially, there were formed Property Insurance Association which offered on the market only policies for the fires caused by events linked with volcanic eruptions. Because these policies were very limited respective to the ensemble of risks to which the real estate owners were exposed and also were very costly, in 1992 the real estate insurance crisis was generalized. This was due in a significant measure to the Iniki hurricane which caused damages estimated at 1,6 billions USD, the bankruptcy of an insurance company, the retreat from the market for another two companies, the canceling of 40,000 insurance policies and the reduction of the supply in the real estate insurance market to a single insurance company and to a limited number of policies.

In this situation, in 1993, the public authorities decided the creation of Hawaii Hurricane Relief Fund. This supposed the formation of some financial funds reserves from the insurance companies, from the re-insurance companies and from a credit scheme. These were supplemented with the insurance premiums collected by HHRF and the special fees for mortgage registration. The HHRF management policy was realized by the participating insurance companies for a small amount of money.

In these conditions, the most part of insurance companies renounced to offer insurance policies against hurricanes and accepted to participate to the Hawaii Hurricane Relief Fund.

Also in the USA, at the federal level, was founded the Federal Emergency Management Agency – FEMA as an independent federal agency which responds directly to the president and has as objectives the preparation for an extreme event, its prevention and the recovery after its occurrence. In this context, FEMA is responsible for the coordination of all the activities in case of floods, earthquakes, hurricanes and other natural or man made extreme events and also for assistance provided to the states, to the local communities and to the individuals.

In the case of an extreme event occurrence, the President has the role to declare the respective event as a disaster. From this moment, FEMA activates the Federal Response Plan which is carried out by 27 public agencies. This federal plan offers the general framework for coordination of the assistance accorded to states to local communities and to individuals.

In the larger framework of the Federal Response Plan was also included the National Flood Insurance Program – NFIP with its three components:

- flood insurance;
- floodplain management;
- flood hazard mapping.

In present, over 20.000 local communities from USA participate on their own will to the National Flood Insurance Program. The program offers flood insurances to the members of the participating local communities.

The flood insurance was offered in this national program framework in order to reduce the costs of the assistance granted after a flood. Implementation of the program generated very fast significant benefits like the reduction of the repair costs for the buildings affected by floods by almost 1 billion USD / year. More, the buildings constructed according to the program standards suffer 80% less damages than the buildings which do not respect these standards.

In Turkey, in 2000, was founded Turkey Catastrophe Insurance Pool – TCIP in order to reduce the financial efforts made by the government which has had the legal duty to reconstruct the houses affected by earthquakes. This was due to the fact that 96% of the Turkey population is probable to be affected by an earthquake.

Although the participation to this government program is mandatory, even linked with the real estate registration, the participation is poor. Even in this situation, the program has all the characteristics needed to succeed to replace post-disaster aids with an insurance, like:

- progressive rates, which determine a moral hazard reduction;
- is mandatory, reducing in this manner the adverse selection;
- is founded on the administrative capacity of the insurance industry;
- has a solid support from private re-insurers the constraint of the program cost at the level of the government.

In order to ensure a cost minimization and to create an efficient operational structure, a lot of the functions and operations of the TCIP were externalized, so, in the present 32 insurance companies are participating to this pool.

The mandatory insurance offered by TCIP could be contracted only for residential buildings which are within the boundaries of a locality. Commercial and industrial buildings could be insured on a voluntary basis. The mandatory insurance offered by TCIP covers the following risks: earthquake and fires, explosions and earth sliding caused by an earthquake.

In Japan there are a single company which could offer re-insurance services for earthquake insurance and was created by a law regarding earthquake insurance – Japan Earthquake Reinsurance – JCR. The Japanese government is responsible for 85% of the company liabilities which are limited to 18 billions USD.

The practiced insurance premiums are based on the data regarding earthquakes from the last 500 years and are a little bit costly. From this reason, only 7% of the buildings owners have an earthquake insurance.

The empirical studies realized on the cases of Bangladesh, Dominican Republic and the Philippines emphasized the fact that the extreme events have a certain effect on public revenues, public expenditures and budget deficit, but this effect could not be identified with accuracy.

In the case of the severe floods from 1998 from Bangladesh, the examination of the dynamics of the principal budgetary policy variables distinguished the fact that this extreme event had a very low impact on public finances.

The extreme events occurred in Dominican Republic, Philippines and Fiji in the last decade of the last century determined the governmental authorities from these countries to reserve a part of public financial resources in order to cover the costs imposed by the occurrence of some extreme events. So, in Philippines was founded a Calamity Fund to which were allocated yearly between 0,4% and 0,7% from the total public expenditures. These funds were supplemented by some special funds at the Prime Minister disposal, representing around 1% of public expenditures.

In the end, we have to recall that the public authorities' intervention using public finances in the case of some extreme events occurrence could affect the population and companies' behavior regarding the risk of such events occurrence. This is due to the fact that, using income and consumption taxation and social transfers there is a dispersion of all kind of risks. Regarding the

risk of an extreme event occurrence, social transfers granted in the case of a disaster could have a crowding-out effect on private insurances and could generate problems related to the intrinsic adverse selection and moral hazard. If the social transfers accorded in the case of a disaster and the public reconstruction of the affected areas are anticipated, this could reduce the population and companies' incentives to ask for insurance at private companies and also to engage in prevention activities. All these have as a consequence an increase in their risk exposure.

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