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# JRC Scientific and Technical Reports

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## **Natural Catastrophes: Risk relevance and Insurance Coverage in the EU**

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Scientific Support to Financial Analysis Unit  
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## Abstract

The present report presents a scientific exercise aimed at drawing a picture of the relevance of various natural catastrophes in the EU Member States and of the development of the Natural Catastrophes insurance markets. The exercise focuses on flood, storm, earthquake and drought and for each disaster JRC collected available qualitative and quantitative information in order to describe the size of the risk and to describe existing practices of insurance systems. The collected information has the purpose to create clusters of Member States facing similar situations and to identify open issues concerning insurance systems in place.

## Executive Summary

The present exercise has been developed by the European Commission (EC) Joint Research Centre (JRC) on a request by DG Internal Market and Services (DG MARKT). Its scope is to assemble publicly available information on insurance practices for Natural Catastrophes (NatCat from now on) in place across European Member States (EU MS). The analysis should bring food for discussion and could be of help for future EC initiatives in the area of insurance for NatCat, e.g. to promote the development of an appropriate market for NatCat insurance products and/or improve the efficiency of existing markets. This exercise should be read as a first step in the development of a EU database on NatCat and of a methodology to analyze and compare NatCat risk and insurance practices across EU MS.

The analysis focuses on **flood, storm, earthquake, and drought**. For each of these NatCat, the JRC collected and processed **publicly available qualitative and quantitative information** from a number of different sources in order to describe the size of the risks and detail existing practices of insurance systems. Interested stakeholders have been also consulted and involved in the collection of data and in the development of the exercise.

The exercise demonstrates that **there is a need for more and better data** on risk and insurance for NatCat and that common definitions should be agreed in order to make data comparable.

The collected information has been used to **create clusters of MS facing similar situations** and to **highlight open issues** of the insurance practices in place. For the first goal quantitative information on the size of economic losses and estimates of penetration rates for each NatCat are analyzed. For the second goal these data are combined with other information on bundling practices, pricing approaches and Government role in the various countries.

The analysis highlights that the **risk** for flood, storm and earthquake is, as expected, **heterogeneous** among MS. However, based on available data, **there are cases where NatCat insurance markets do not seem to fully cope with existing risks**. Some indications on the development of the markets can be drawn by comparing estimated penetration rates with NatCat bundling practices. For flood and earthquake, penetration rates are high only when coupled with bundling. The situation for storm looks better, since penetration rates are high in most MS. For drought, penetration rates are in most cases very low, but available information is too little to draw any general conclusion.

Results show that financial *ex-post* interventions by the Governments could have a mixed influence on penetration rates: while for flood *ex-post* Governments interventions are associated with medium-low penetration rates, for storm penetration rates of MS with *ex-post* Government interventions can be high.

Finally, drawing general conclusions on insurance practices based on a single NatCat might not be exhaustive since available data give the impression that **dedicated markets have developed** in some MS only for some risks but not for others.

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# 1 Introduction

On 10 March 2010, Commissioner Barnier announced that the European Commission (EC) would carry out an in-depth examination of insurance schemes covering Natural Catastrophes (NatCat from now on). This initiative involves a broad range of stakeholders and includes a dialogue with European Member States (EU MS) and insurance experts in order to exchange examples of best practices and to fix priorities at an appropriate level.

In general terms, interventions in respect of NatCat risks take three main forms:

- **Prevention** - including reducing the probability and impact of NatCat (e.g. via flood barriers, regulation of building on flood plains, etc.), enhancing citizens' awareness, etc...
- **Insurance** – including regulation of private companies providing NatCat insurance, the public provision of such insurance, etc...
- **Ex-post Government response** – including aid for victims, restoration of public services, etc...

The market of NatCat insurance is clearly affected by the size of preventive measures as well as by *ex-post* Government interventions. Moreover other insurance practices such as bundling<sup>1</sup> and pricing rules can play a role.

Extensive work on NatCat risks has been undertaken and/or initiated in the EC in recent years, partly in response to evidence that the probability and impact of NatCat will be negatively affected by climate change. Examples of the work developed so far are the White Paper on adapting to climate change (EC (2009(b))), the Communication on a Community approach to the prevention of natural and man-made disasters (EC (2009(a))), the adoption of the Flood Directive (EPC (2007)), and the creation of the European Solidarity Fund (EPC (2002)).<sup>2</sup> The work developed so far has been not primarily focused on insurance for NatCat and the work-plan is in general very long term oriented.

In spring 2011, the Unit for Scientific Support to Financial Analysis of the EC Joint Research Centre (JRC) was asked by the Unit of Insurance and Pensions of DG Internal Market and Services (DG MARKT – H2) to develop a scientific exercise aimed at drawing the picture of the relevance of various NatCat in the EU MS and of the development of the NatCat insurance markets.<sup>3</sup> The

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<sup>1</sup> Practices of including NatCat coverage in another base policy.

<sup>2</sup> Also the document developed by the United Nations (UN (2011)) can be a resource for understanding and analyzing global NatCat risks today and also in the future.

<sup>3</sup> This research has been financed by DG MARKT with the contract Markt/2011/115/H2/SE/C.32305-2011-03 NFP ISP. NatCat: Risk Relevance and Insurance in the EU – September 2012



analysis should bring food for discussion and could be of help for future EC initiatives in the area of insurance for NatCat, e.g. to promote the development of an appropriate market for NatCat insurance products and/or improve the efficiency of existing markets. The exercise should be read as a first step in the development of a EU database on NatCat and of a methodology to analyze and compare NatCat risk and insurance practices across EU MS.

In October 2011 DG MARKT organized the conference "*Prevention and Insurance of Natural Catastrophes*"<sup>4</sup> to bring together stakeholders, experts from the insurance sector and the academia. JRC was invited to present the developed exercise. A preliminary version of the present report was circulated among the participants at the conference with the aim of collecting comments and additional information from the audience. On the basis of the collected inputs, an updated version of the report was published to get additional inputs from stakeholders. The present report incorporates comments and information received from the participants at the conference, as well as the additional inputs from stakeholders.<sup>5</sup>

The focus of the present exercise is on flood, storm, earthquake, and drought. For each of these NatCat, the JRC has collected both qualitative and quantitative information from a number of different sources. For every MS the JRC has processed available information in order to describe the size of the NatCat and detail existing practices of insurance systems, focusing in particular on:

- detecting which NatCat can be considered as relevant in any given MS;
- for relevant risks, investigating if there exists a market of dedicated insurance products;
- identifying the main issues and open problems.

The collected information has the purpose to create clusters of MS facing similar problems and to identify open issues concerning insurance systems in place. For the first goal quantitative information on the size of economic losses related to each NatCat is analyzed. For the second goal these data are combined with other available information on bundling practices, pricing approaches and role of Government in the various countries.<sup>6</sup>

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<sup>4</sup> See [http://ec.europa.eu/internal\\_market/insurance/natural-catastrophes\\_en.htm](http://ec.europa.eu/internal_market/insurance/natural-catastrophes_en.htm)

<sup>5</sup> JRC would like to thank all the stakeholders that sent comments and helped improving the quality of the information presented in this report: representatives of ABI, Association of Hungarian Insurance Companies (MABISZ), BIPAR, CEA, CCS, DG JUST, FERMA, FFSA-GEMA and MRN, Insurance Europe, German Insurance Association (GVD), Italian Insurance Association (ANIA), Ministry of Finance of CZ, Swiss Insurance Association (SIA), Oxera, UN, World Bank and Andrew Dlugolecki, Visiting Research Fellow, Climatic Research Unit, University of East Anglia

<sup>6</sup> Information on other issues, such as preventive measures in place, the existence of cat-bonds and of other insurance derivatives, alternative risk management solutions, the level of public awareness, adverse selection and moral hazard  
NatCat: Risk Relevance and Insurance in the EU – September 2012

Moreover, JRC has produced individual country-fiches describing for every MS and for every risk NatCat insurance practices in the MS and the corresponding data sources.

It should be emphasized that the analysis does not aim at identifying best insurance practices in place, because EU MS are exposed to various and diverse risks and a one-size-fits-all EU solution would not be feasible.

Extensive work on NatCat financial management has already been developed by OECD, Consorcio de Compensacion de Seguros, CEA, World Bank and United Nations and Intergovernmental Panel on Climate Change, among the others (OECD (2008), CCS (2008), CEA (2009), WB and GFDRR-UN (2010) and IPCC (2012)). All these documents treat important aspects dealing with NatCat; among others it is worth mentioning the impact of climate change on insurance systems, the role of insurances, Governments and policy makers and their interactions, the implementations of direct and indirect strategies to ensure financial coverage and to reduce disaster risks. However most of the analyses developed so far focus on few selected EU countries and provide heterogeneous information, which can be hardly used to draw general conclusions at EU level. The contribution of the present work is to attempt to assemble all publicly available qualitative and quantitative information on some key issues of insurance for NatCat in the EU MS, to summarize this information in such a way to make it comparable among countries, and to propose a way to read results to attempt drawing general conclusions. However, the collected database is not very extensive and results should be carefully read.

The report is organized as follows: Section 2 describes all the data (both qualitative and quantitative) collected for this exercise; Section 3 develops the analysis and shows the clusters and Section 4 concludes. This report is accompanied by two Annexes. In Annex I the available quantitative data are reported for all MS; in Annex II there is a collection of synthetic country-fiches, prepared for each MS and for each NatCat, describing the main features of the insurance system in place.

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is difficult to retrieve and it is hardly comparable across MS. Thus data on such issues could not be used in the analyses.

## 2 Description of the data

This section gives a comprehensive overview of the collected information from publicly available sources as well as additional data received from stakeholders. We first introduce quantitative data (historical losses, simulated losses and penetration rates) and then we give an overview of the main features the various insurance contracts can offer on the market for the different NatCat (with a focus on bundling, pricing practices and Government involvements). All this information will be used to develop the analysis in Section 3.

The focus is on the following NatCat: flood, storm, earthquake and drought. There exists no common definitions of these NatCat and the only available definitions come from EM-DAT (see Section 2.1.1) and, to a lower extent, from EEA (2010).

- Flood: significant rise of water level in a stream, lake, reservoir or coastal region.
- Storm: events caused by short-lived/small to meso scale atmospheric processes (strong winds usually in combination with heavy precipitation) in the spectrum from minutes to days.
- Earthquake: shaking and displacement of ground due to seismic waves.
- Drought: extended period of time characterised by a deficiency in a region's water supply that is the result of constantly below average precipitation.

Table 1 gives an overview of the information availability for each NatCat (Flood = F, Storm = S, Earthquake = E, Drought = D). An "X" in the Table means that at least one data is available (one historical data, one simulated loss distribution or little qualitative information). Empty cells do not mean that the NatCat is not relevant and/or that there is no dedicated insurance system in place, but that no data/information was found.

As Table 1 shows, quantitative data are mostly available for flood and storm; qualitative information is available for most MS (though to different extents) for all risks but drought.

Quantitative data for each MS and for each NatCat are reported in Annex I; all qualitative information for each MS and NatCat and the corresponding source of information are summarized in synthetic fiches in Annex II.

Table 1: Summary of the available information. Empty cell = no data/information available

	Historical data				Loss distributions				Qualitative information			
	F	S	E	D	F	S	E	D	F	S	E	D
BE	X	X	X		X				X	X	X	
BG	X				X				X	X	X	
CZ	X	X			X				X	X	X	
DK		X		X	X				X	X		
DE	X	X	X		X	X	X		X	X	X	
EE		X			X							
IE	X	X			X				X	X	X	
GR	X	X	X	X	X				X	X	X	
ES	X	X	X	X	X				X	X	X	
FR	X	X		X	X				X	X	X	X
IT	X	X	X	X	X		X		X	X	X	
CY		X	X									
LV		X			X							
LT		X		X	X							
LU	X	X			X				X	X		
HU	X	X		X	X				X	X		
MT												
NL	X	X	X		X				X	X	X	
AT	X	X			X	X	X		X	X	X	
PL	X	X			X				X	X	X	
PT	X	X		X	X				X	X	X	
RO	X			X	X				X		X	
SI	X	X	X		X				X	X	X	
SK	X	X			X				X	X		
FI		X			X				X	X		
SE		X			X				X	X	X	
UK	X	X	X		X	X			X	X	X	
Total	19	24	9	9	25	3	3	0	22	21	17	1

## 2.1 Quantitative data

In this exercise we make use of economic losses due to NatCat; analyses mainly rely upon historical losses and, where available, also upon loss distributions simulated via different models.

The collection of historical and simulated losses is useful to assess how relevant a given NatCat has been (according to historical data) and how relevant it could be (according to simulated loss distributions) in each MS.

Before describing the data we have collected, we introduce the following variables which will be adopted in the remainder of this work.

“**Total losses**” are the amount of losses due to an occurred NatCat. “**Insured losses**” are the sum of all claims to be paid back by insurers; this amount takes into account potential deductibles and limits applied by insurances.

In principle data on both variables would be needed to get a clear picture of the relevance of the risk and of the size/efficiency of the insurance system. However, as detailed in the next Section, there are problems in collecting data on insured losses from publicly available sources and thus the present work will only rely upon data on total losses.

### 2.1.1 Historical data

Collected historical data refer to estimated economic damages (total losses from now on) occurred in past events. The main source for historical total losses is the Emergency Events Database<sup>7</sup> (EM-DAT), a freely accessible database. EM-DAT contains essential core data on the occurrence and effects of over 18 000 mass disasters (both natural and technological disasters are recorded) in the world from 1900 to present. The database is compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies. A disaster is included in this database if it fulfills at least one of the following criteria<sup>8</sup>:

- 10 or more people reported “killed”
- 100 or more people reported “affected”
- Declaration of a state of emergency
- Call for international assistance

For each disaster a number of data are recorded; for the purposes of our work we have focused on the total losses, which consists of direct (i.e. damage to infrastructure, crops, housing) and indirect (i.e. loss of revenues, unemployment, market destabilization) losses spilled over the local economy. However, this information is not available for all recorded events: for example in the extracted dataset, economic losses are available for 318 events (flood, storm, earthquake and drought) out of 561 recorded from 1990 to 2010.

Data on historical total losses due to floods and earthquakes can also be found in the EEA (2010) report. Moreover a variety of other sources specific for each MS and each NatCat have been used to estimate total economic losses.<sup>9</sup>

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<sup>7</sup> EM-DAT has been developed by the Centre of Research on Epidemiology of Disasters (CRED), Université Catholique de Louvain, Belgium: <http://www.emdat.be/>

<sup>8</sup> These thresholds might exclude from records some minor events which are covered by dedicated insurance in some MS. For this reason, we have also used data from other sources.

<sup>9</sup> All sources of information are listed, for every MS, at the end of the fiches reported in Annex II. NatCat: Risk Relevance and Insurance in the EU – September 2012

In addition to total losses, another useful data could be the amount of insured losses, which can be found in various reports dealing with insurance systems' issues for natural catastrophes. However data on total and insured losses are usually not jointly provided by the same source and particular attention should be paid when coupling these two figures. This problem arises, among the others, from the fact that different sources seem to aggregate data with different criteria: for example, some documents provide for the amount of losses aggregated per year, while other sources provide for losses referring to (some) specific events in a given year. Moreover, the database for insured losses is smaller than the one for total losses. For all these reasons this analysis focuses on total losses.

The construction of the dataset on historical total losses presented the following problems:

- Lack of common definitions. There is no common set of definitions for the NatCat and for the quantitative variables necessary to perform the analysis.
- Missing data. Although NatCat have been recorded, total losses are not available in some cases. Thus the database of historical data is quite poor and it is insufficient to build empirical loss distributions at MS level.
- Heterogeneous data. Different sources provide for different estimates of total losses referring to the same event and/or the same year. Despite the use of data from different sources could be an issue, since they might be estimated using different criteria, the scarcity of quantitative data on NatCat forces to exploit the available information at most. Greater access to NatCat data could improve the robustness of the exercise.
- Reference year. In some cases the year the amount refers to is not clear.

For the purpose of our exercise, historical data, reported in Annex I for every MS and for every NatCat, have been treated as follows.

- Data have been aggregated per year.
- When different sources provide for an estimate of the losses occurred in the same year, the average value over all the sources has been used.
- Historical losses have been reported to 2010<sup>10</sup> prices, where possible.

Figure 1 and Figure 2 show for flood and storm the distribution of historical total losses for all MS and for all years. Losses are expressed as a percentage of the 2010 GDP of each MS. The number

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<sup>10</sup> To estimate costs at 2010 prices the index of Harmonized Consumption Price Index available on the Annual Macro-Economic Database (AMECO) developed by DG ECFIN has been used:  
[http://ec.europa.eu/economy\\_finance/db\\_indicators/ameco/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm)  
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of data for the two graphs is 109 each. For drought and earthquake the number of data is too small (14 and 19 respectively) to plot the whole distribution.

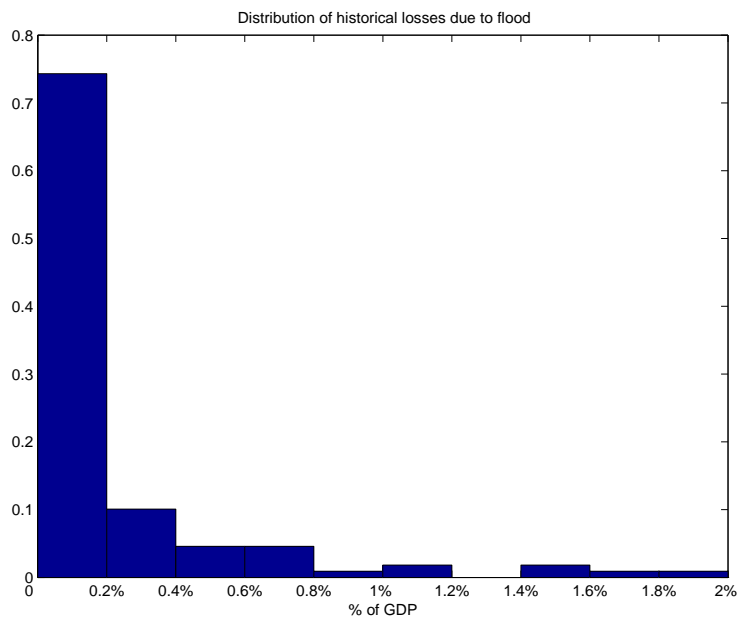


Figure 1: Distribution of historical total losses due to flood based on available data

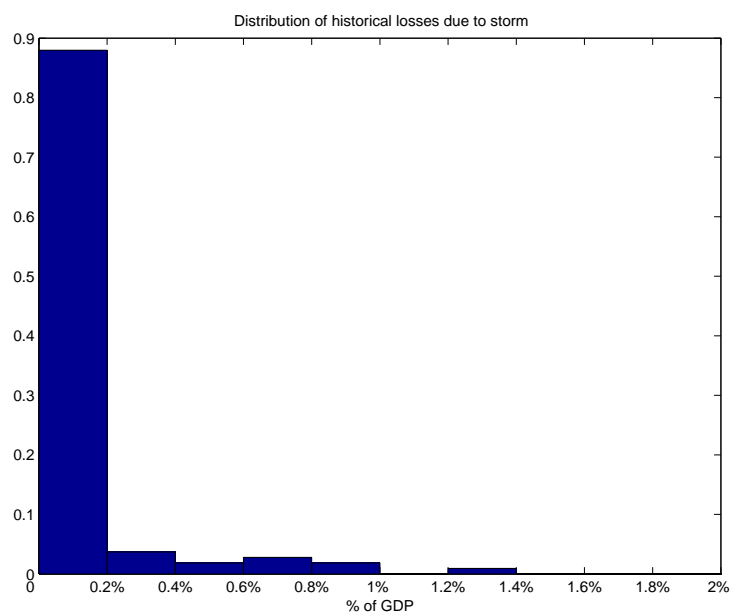


Figure 2: Distribution of historical total losses due to storm based on available data

## 2.1.2 Simulated loss distributions

To complement information from historical data, also simulated loss distributions from statistical models (e.g. hydrological models for floods) have been collected and used in the present analysis, in particular for flood. The simulated loss distributions considered do not explicitly account for climate and global changes because the work focuses on the current systems in place.

Sources of information for simulated loss distributions are the following:

- Loss distributions for flood come mainly from the report by DG CLIMA “Application of Economic Instruments for Adaptation to Climate Change” (the report is forthcoming) and they are estimated for 24 out of 27 MS (CY and MT are not included, while for the UK only one percentile has been estimated).
- ANIA (2011) report. Here loss distributions due to flood and earthquake are presented for IT; losses refer to the reconstruction cost for private households (and thus it is an underestimate of the total loss distribution).
- ABI (2009) report. In this report two percentiles of the insured loss distribution (99<sup>th</sup> and 99.5<sup>th</sup>, corresponding to 100 and 200 years return period) for UK are estimated under the hypothesis of a global temperature rise of 4°C (flood) and under the hypothesis of a 1.45° southward shift in storm track across the UK (storm). Loss distributions and the percentiles’ percentage variations with respect to the current situation are reported and thus we can get an estimate of the current loss distributions for both NatCat.
- AON Benfield<sup>11</sup> produced an estimate for CEA of the insured loss distributions due to windstorm, flood and earthquake for AT and DE.

Only distributions from DG CLIMA, simulated under the same set of hypotheses for all MS, have been used to compare MS and to draw general conclusions on the potential impact of flood. The other distributions are estimated from different models and only for specific countries and thus they can be used only to draw specific conclusions for those selected MS.

All data collected on simulated loss distributions are reported in Annex I for each MS where they are also compared with data on historical losses, where available.

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<sup>11</sup> Aon Corporation is a leading provider of risk management services, insurance and reinsurance brokerage and human capital and management consulting. <http://www.aon.com/>  
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### 2.1.3 Penetration rates

The penetration rate measures the percentage of global insurance premiums over a country's gross domestic product. Estimates of the penetration rates for the EU MS are shown in Table 2. The main source of information is the CEA (2009) report. In this report, rough estimations of the rates are given in terms of ranges: in order to be coherent with these data, information gathered from other sources<sup>12</sup> is given in terms of ranges as well.<sup>13</sup>

Figure 3 summarizes how penetration rates are distributed at EU level. If we take into account the pie related to flood, we can conclude that in 19% of EU MS the rate of penetration is high (higher than 75%), in 29% of EU MS the rate of penetration is moderate (22% in the range 25% - 75% and 7% in the range 10% - 25%), in 15% of EU MS the rate of penetration is low (lower than 10%). Finally, information is not available (n.a.) for 37% of EU MS. Note that "n.a." indicates either that the NatCat is relevant in the MS but the rate is not available or that the NatCat is not relevant in the MS. Given the little information collected, such a distinction cannot be exploited.

By comparing the four pies we can see that distributions of penetration rates considerably vary, depending on the risk: for example, storm is the risk with the highest percentage of MS with a high penetration rate (green slice), while in the case of drought for most MS information is not available (light orange slice). This heterogeneity can be explained in part by the objective difference in the geophysical and meteorological situations in the MS and the consequent different risk exposures; however, other possible explanations could be the different risk perceptions and awareness among the citizens, and the different Government intervention policies in place.

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<sup>12</sup> The other sources are CEA (2011), OECD (2008), World Bank Project (2008), Dissemination Workshop on Catastrophe Insurance in Bulgaria (<http://natkat.insurance.bg/2008/en/index.php?more=en>) and exchange of information with representatives of GDV (German Insurance Association) and ANIA (Italian Insurance Association).

<sup>13</sup> Penetration rates are given in terms of ranges, but for computations they are translated into discrete numbers as follows: <10%: 5%; 10 – 25 %: 17.5%; 25 – 75%: 50%; > 75%: 90%.  
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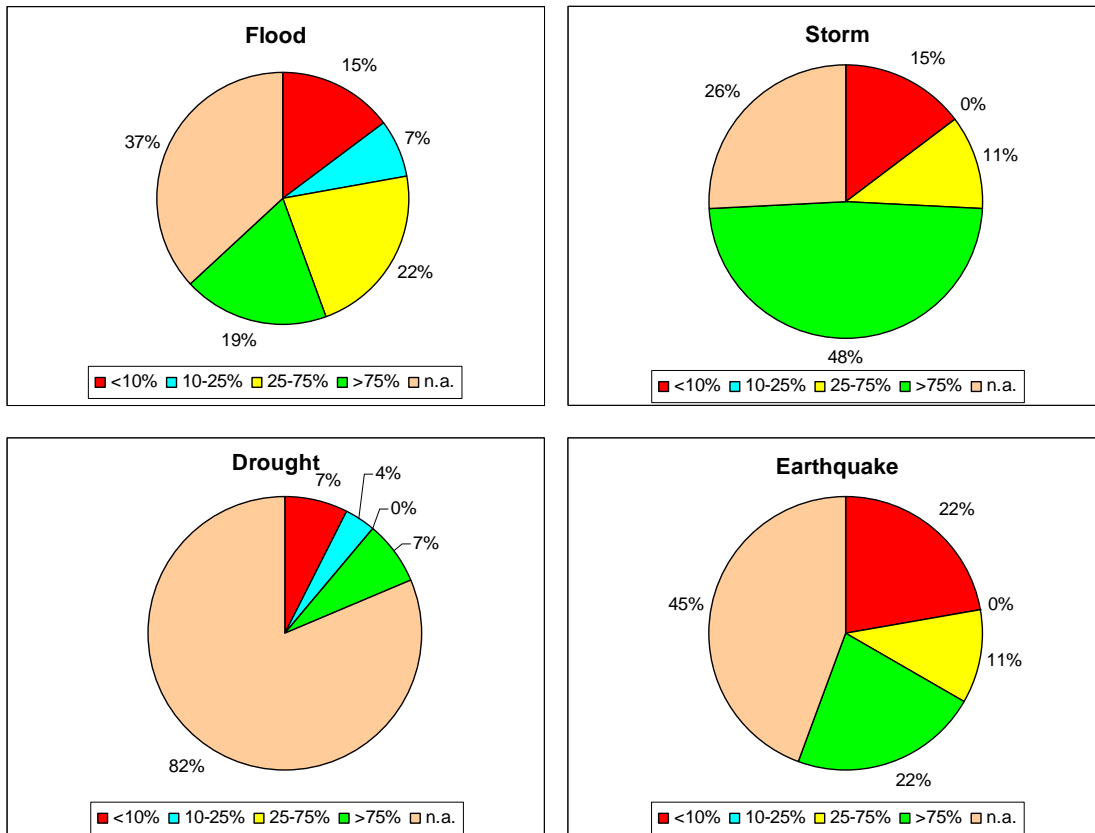


Figure 3: Distribution of penetration rates based on available information

Table 2: Penetration rates per MS, available data

	Flood	Storm	Earthquake	Drought
BE	>75%	>75%	>75%	
BG	<10%	<10%	<10%	
CZ	25-75%	25-75%	25-75%	<10%
DK		>75%		
DE	25-75%	>75%	25-75%	
EE				
IE	>75%	>75%	>75%	
GR	<10%	<10%	<10%	
ES	25-75%	25-75%	>75%	<10%
FR	>75%	>75%	>75%	>75%
IT	<10%	<10%	<10%	
CY				
LV				
LT				
LU	<10%	>75%		
HU				
MT				
NL		>75%		
AT	10-25%	>75%	<10%	10-25%
PL	25-75%	>75%		
PT	25-75%	25-75%	<10%	
RO		<10%	<10%	
SI	25-75%	>75%	25-75%	
SK				
FI	10-25%	>75%		
SE	>75%	>75%	>75%	>75%
UK	>75%	>75%	>75%	

## 2.2 Description of qualitative data

Insurance practices are very heterogeneous among the EU MS. In the following we summarize the collected information on main features of the insurance practices for the different NatCat, which will be part of the analysis developed in Section 3. The focus is on those issues which can influence the development and the efficiency of the insurance markets.

Ideally it would be interesting to analyze insurance practices for NatCat for personal and non-personal lines but, due to lack of such detailed information, this level of analysis cannot be exploited.

### Bundling

Coverage against NatCat is sold on a voluntary basis in all MS where information is available but in RO and NL (flood and earthquake). In RO dwelling insurance against flood and earthquake is compulsory, while in NL flood and earthquake coverage is not insurable and citizens receive from the Government *ex-post* compensations.

The insurance contract against NatCat can be sold on the market as an optional extension to a base policy or it can be automatically bundled to a base policy, generally a fire or a household insurance. Flood coverage is bundled to a base insurance in 10 MS (BE, CZ, DK, IE, ES, FR, PT, SI, SK, and UK), storm coverage in 11 MS (BE, CZ, IE, ES, FR, LU, HU, AT, PT, FI, and UK) and earthquake coverage in 5 MS (BE, IE, ES, FR, and UK). For countries with a high exposure to a variety of risks, the pooling of risks can be achieved by combining these risks into the same extended property damage cover (CEA (2011(b))). This is the situation in place, for example, in BE, ES, and FR.

### Limits and deductibles

Some insurance contracts impose specific limits and deductibles; for example, they can be a fixed amount or a certain percentage of the insured capital. Depending on the specific features, these practices may influence how a NatCat insurance system may develop.

Limits and deductibles are applied in 12 MS (BE, CZ, DK, DE, GR, ES, FR, AT, PT, RO, SK and UK) for flood<sup>14</sup>, in 10 MS (BE, CZ, DK, DE, GR, ES, HU, NL, PT and UK) for storm and in 12 MS (BE, BG, CZ, DE, GR, ES, FR, AT, PT, RO, SE and UK) for earthquake. In some cases specific rules are set, while in other cases limits and deductibles depend on the issued contract.

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<sup>14</sup> In DK it refers to flood due to storm.

In BE an upper limit to the total indemnification paid by insurers and by the Caisse Nationale des Calamites is fixed. If the total amount to be paid exceeds this limit, indemnifications are reduced proportionally.

In AT the limit for buildings' flood and earthquake insurances reaches a certain percentage of the insured capital or a fixed amount.

In RO the limits for buildings' flood and earthquake insurances are € 10 000 or € 20 000, depending on the dwelling's risky class.

Concerning deductibles, the rules for the part of damages not covered are expressed as a percentage of the insured losses, which ranges in general between 2% and 10%, or fix a defined amount of money not to be paid back, usually ranging between € 200 and € 1 500.

### **Risk based vs flat pricing**

The way NatCat coverage is priced among EU MS is very heterogeneous. Some MS adopt a risk-based pricing mechanism, while others adopt flat pricing, invoking the principle of solidarity. The adoption of risk-based premiums does not affect the financial efficiency of the insurer (which is regulated by solvency requirements), but it might reduce the moral hazard and it might lead to a better understanding of the development of risk.

Risk-based premiums are in place in 6 MS (CZ, DE, IE, GR, RO and UK) for flood, 6 MS (CZ, DK, DE, IE, GR and UK) for storm and in 6 MS (BG,DK, DE, IE, PT and RO) for earthquake.

In CZ, DE and UK insurance companies use risk zoning systems to assess the premiums for flood and storm,<sup>15</sup> while in RO premiums depend on the type of dwelling to be insured (€ 20 for type A buildings (reinforced concrete frames, metal or with outside walls made of burnt brick or wood) and € 10 for type B (outside walls made of un-burnt bricks or other forms of adobe)). In AT and PL (flood and storm) the use of risk zoning systems for pricing purpose is under consideration.

Flat rates also have different features among EU. They can be a fixed percentage of the insured capital (ES), a percentage of the premium paid for a base contract to which the NatCat insurance is bundled (FR), or they can be in the form of a fixed charge included in the fire insurance, like in DK.

### **Role of the Government**

The roles EU Governments play when dealing with NatCat vary a lot, as in some MS Governments are involved in *ex-ante* financial planning, while in others they only provide for *ex-post*

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<sup>15</sup> UK is moving beyond flood risk zoning, towards individual risk rating: some insurers are beginning to calculate the flood risk at the level of individual buildings.

reimbursements. Also the *ex-ante* measures they take vary notably. For a detailed description of the systems in place in every MS see Annex II.

In BE, DK and AT the Government, through the Minister of Economy, manage special funds devoted to (partially) reimburse flood losses<sup>16</sup>. In ES it backs the Consorcio de Compensacion de Seguros with an unlimited guarantee (which has never been used until now).<sup>17</sup> In FR the Government provides for unlimited guarantee to the Caisse Centrale de Reassurance, a state-owned reinsurance company.

In other MS, like in CZ, DE, IT, PL and FI, no special *ex-ante* measures have been taken and Governments *ex-post* reimbursed damages related to NatCat in the past. However, in DE and FI the situation has recently changed. In DE the Government had provided, in the past, for *ex-post* compensations to victims of NatCat. Now, it does not pay subsidies any more, but it gives loans at low interest rates to victims of NatCat. The loans are intended to bridge the time until claim settlements by the insurance are done. In FI a bill has recently abolished the state flood cover.

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<sup>16</sup> In DK it refers only to flood due to storm.

<sup>17</sup> The Consorcio de Compensacion de Seguros is a public business entity whose main aim, in this field, is to indemnify with its own resources (different from those of the State) claims made as a results of extraordinary events.  
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### 3 Analysis

The purpose of the present analysis is to propose a methodology to compare the different insurance systems for NatCat in place across MS. On the basis of the available information, the analysis also attempts to create clusters of MS facing similar problems and to identify open issues of the insurance systems in place.

**Clusters** are built on the basis of quantitative information: historical losses, simulated loss distributions and penetration rates. The analysis is composed of the following steps:

1. Starting from historical data described in Section 2.1.1, we consider, for every MS, the maximum historical total loss over the horizon 1990-2010 as a % of its 2010 GDP<sup>18</sup>. The maximum loss occurred over a 20-years time horizon may underestimate the relevance of a given risk, but in most cases this is the only feasible procedure to get a rough estimate of the risk relevance. For floods simulated distributions are also used to assess the potential risk relevance and in the present exercise we focus on the 99<sup>th</sup> percentile of the simulated distributions (100-years return period). We assume that the size of (potential) losses is the first piece of information on the relevance of a given NatCat in each MS. Figure 4, Figure 5, Figure 6 and Figure 7 give a picture of the size of maximum historical losses for each MS and for every NatCat, where data are available.
2. Maximum historical losses are given a score reflecting the magnitude of the loss. Low scores correspond to small losses (as a percentage of GDP) while high scores to relevant losses (up to some percentage points of the GDP).

The criteria adopted to score losses are detailed, for every risk, in Table 3, Table 6, Table 9 and Table 12. Criteria differ for each NatCat as they depend on the size of the available dataset and the range of variation of losses; also the size of the intervals associated to each score depend on the range of variation of the historical data. For example, in the case of storm the dataset is quite populated and thus scores vary between 1 and 6. On the contrary, in the case of earthquake, the dataset is less populated and two scores (1 and 2) are sufficient. Box 1 presents an example on how to assign scores and read results.

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<sup>18</sup> Economic losses and the GDP are expressed in Euro. Country GDP are available on the Annual Macro-Economic Database (AMECO); exchange rates euro/dollar are available on Eurostat: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>  
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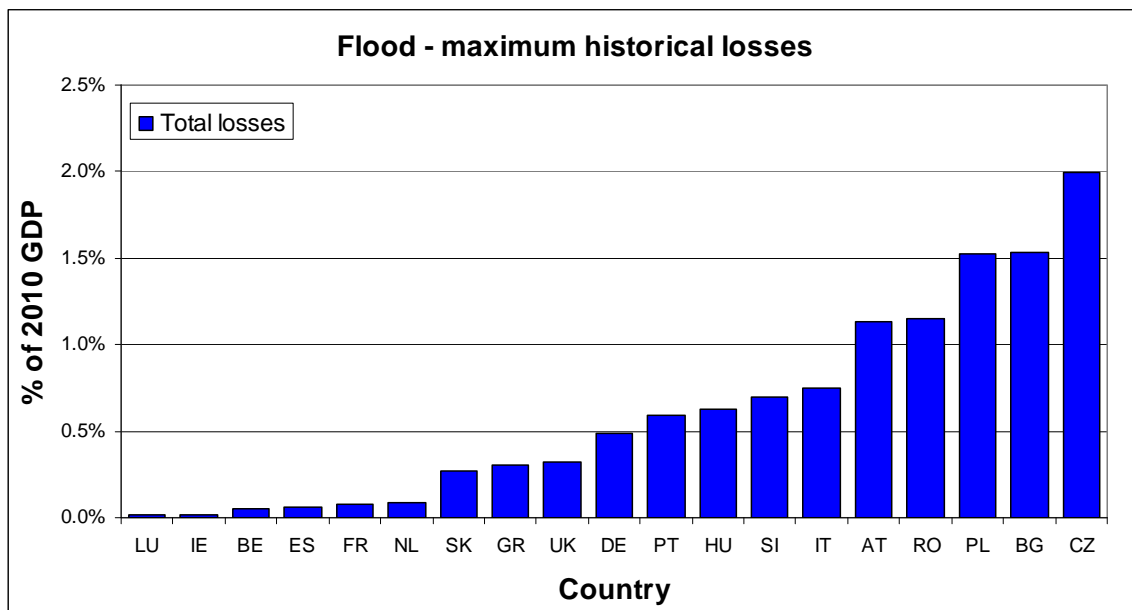


Figure 4: Flood - maximum historical losses based on available data

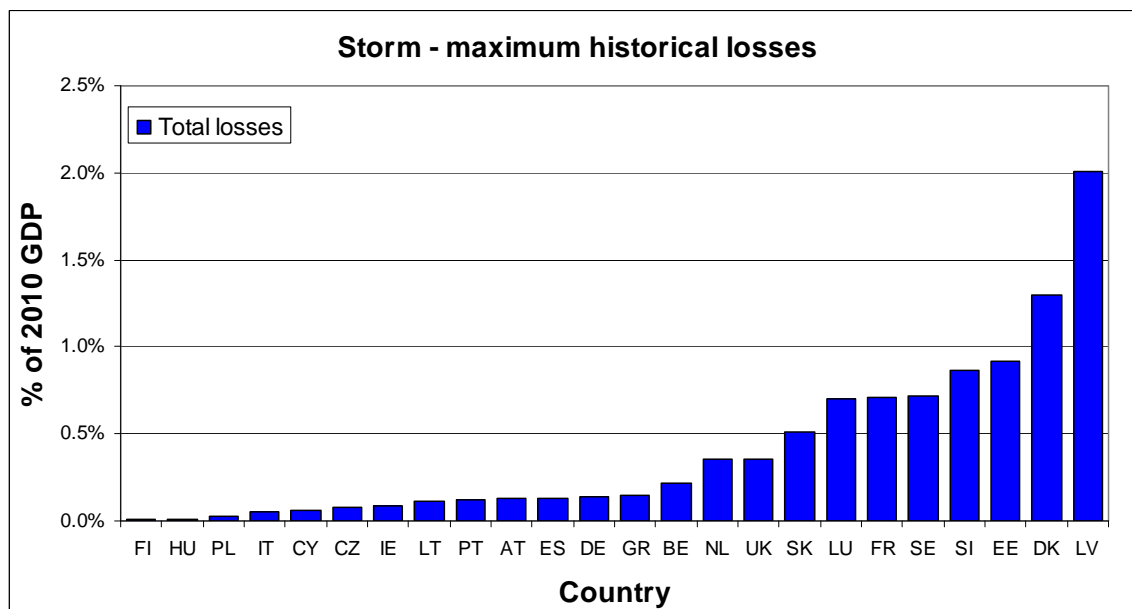


Figure 5: Storm - maximum historical losses based on available data



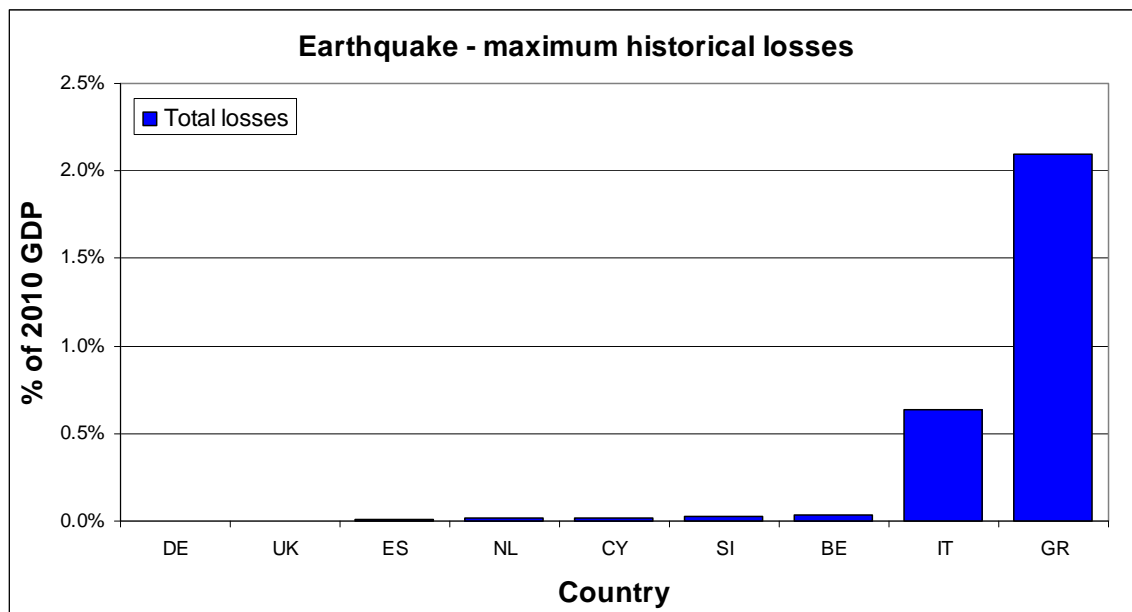


Figure 6: Earthquake - maximum historical losses based on available data

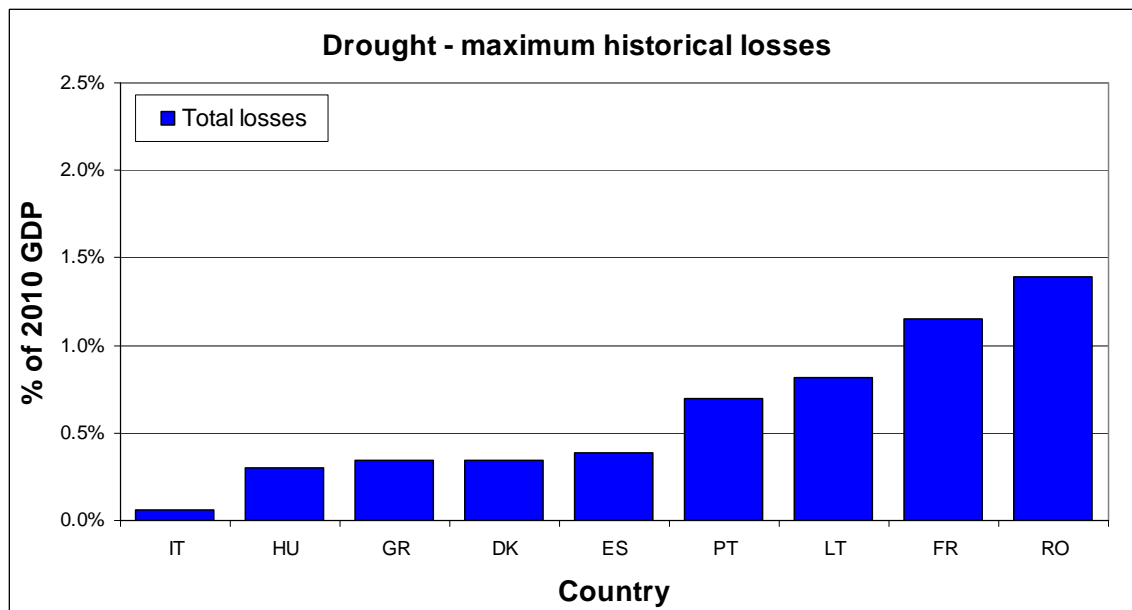


Figure 7: Drought - maximum historical losses based on available data

**Box 1: how to assign scores using the criteria and read results.**

**Example 1**

In FR, the maximum loss due to storm is around 0.7% of the 2010 GDP and, according to Table 6, it gets a score equal to 3, thus a storm in FR could have a medium impact.

**Example 2**

In the case of flood the same exercise can be performed by using also a high percentile of simulated loss distributions, for instance we can consider the 99<sup>th</sup> percentile, corresponding to the 100-years return period. In this case we can come up with an estimate of the potential relevance of the risk. For example in LU the highest flood event is around 0.02% of 2010 GDP and it can be classified as a low risk (being the score equal to 1, according to Table 3). If instead we consider simulated losses, the 99<sup>th</sup> percentile of the distribution corresponds to 3% of 2010 GDP, thus flood should be considered a relevant risk (being the score equal to 6, according to Table 3).

To achieve the objective of building clusters of MS facing similar situations, for every NatCat we assemble all quantitative information in a single table (Table 4, Table 7, Table 10 and Table 13) reporting for each MS the estimated scores, the bundling practices and the penetration rates. On the basis of this information we attempt to derive clusters of MS where the NatCat may have similar impact and where similar insurance systems are in place.

To facilitate the reading, cells in the Tables have been colored. Cells referring to losses are green if the size of the losses gets a low score, they are yellow if the size of the losses gets an intermediate score and red if the size of the losses gets a high score. Cells referring to bundling practices are green if the NatCat insurance is bundled to another policy. Cells referring to penetration rates are green if the penetration rate is high (>75%), yellow if it has an intermediate value (between 10% and 75%) and red if it is low (<10%).

**Open issues** in the various MS are identified on the basis of qualitative information which has been summarized, for every NatCat and for every MS, in Table 5, Table 8, Table 11 and Table 14. In order to gather an overview of the situation in place in every MS for every risk, the two tables built for every risk must be jointly read (Table 4 and Table 5, Table 7 and Table 8, Table 10 and Table 11, Table 13 and Table 14).

### 3.1 Flood

Table 4 summarizes the main information for flood for every MS. Column A reports the relevance of the problem, in terms of scores, on the basis of historical data. Column B shows the scores obtained using the 99<sup>th</sup> percentile (corresponding to 100-years return period) of the simulated loss distributions. Column C indicates if flood insurance is bundled to other policies (Y/N). Column D reports the penetration rate and column E draws the main conclusions on the basis of the information contained in the previous columns.

Comments on the size of the NatCat are derived from the scores, while appropriateness of insurance systems and other conclusions are drawn coupling the scores with information on bundling and penetration rates.

The ranges adopted to rank losses are summarized in Table 3. Ranges refer to percentages of GDP, as we have turned losses in % of GDP.

Table 3: Flood - ranges adopted to score losses

	Ranges
1	<0.5%
2	0.5% - 1.0%
3	1.0% - 1.5%
4	1.5% - 2.0%
5	2.0% - 2.5%
6	>2.5%

Using information in Table 4 the following clusters of MS can be attempted:

1. Cluster 1: BE, IE, FR, SE, and UK. In all these MS the various the insurance market seems to have efficiently developed, as total losses (both historical and simulated) are not very high, while penetration rates are high. This could be mainly due to the fact in all these MS NatCat insurance is bundled with another base policy, usually fire, households and damages insurances (see column C).
2. Cluster 2: ES and PT. Also in these MS the insurance market seems to be rather adequate because both total losses and the potential impact of flood are low. However, the rate of penetration is not that high (25% - 75%).
3. Cluster 3: DE, GR and IT. In these MS total losses and potential impact of flood, when insurance in place is considered, are low, but flood insurance is sold on the market only as an optional extension of other policies and the rate of penetration is low (lower than 30%).

4. Cluster 4: PL and SI. Here the size of the NatCat is moderate according to both the historical data and the 99<sup>th</sup> percentile of the loss distribution. Flood coverage is sold as an optional extension<sup>19</sup> and the penetration rate is low.
5. Cluster 5: BG, AT and FI. In these MS both total losses and potential impact of flood are moderate. Flood insurance in BG and AT is sold as an optional extension in basic homeowners policies. The rate of penetration is quite low.

Figure 8 shows the EU map of the clusters.

NL is a special case because flood is not insurable but the Government reimburses in case of need.

Some MS have not been included in any of the above clusters, because of the lack of detailed information (EE, CY, LV, LT, HU, MT). The remaining MS (CZ, DK, LU, RO, SK) have heterogeneous characteristics.

As can be seen in column A of Table 5, limits and/or deductibles are in place in many MS (12 out of 15 for which information is available).

8 MS (BG, DK, ES, FR, NL, AT, PL, SE) do not apply risk-based premiums, as can be seen in column B of Table 5.

Column C of Table 5 summarizes all the MS where the Government is financially involved in flood insurance, while column D describes other public non-financial intervention. Except for IE and UK, where the State does not intervene, in all the other MS Government is, to different extents, involved. Financial interventions labeled as "Y\*" indicate that in the past *ex-post* interventions have been made by the Governments. We note that for flood *ex-post* Governments interventions are associated with medium-low penetration rates.

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<sup>19</sup> In CZ flood coverage is included in a basic cover or it is offered as an optional extension.  
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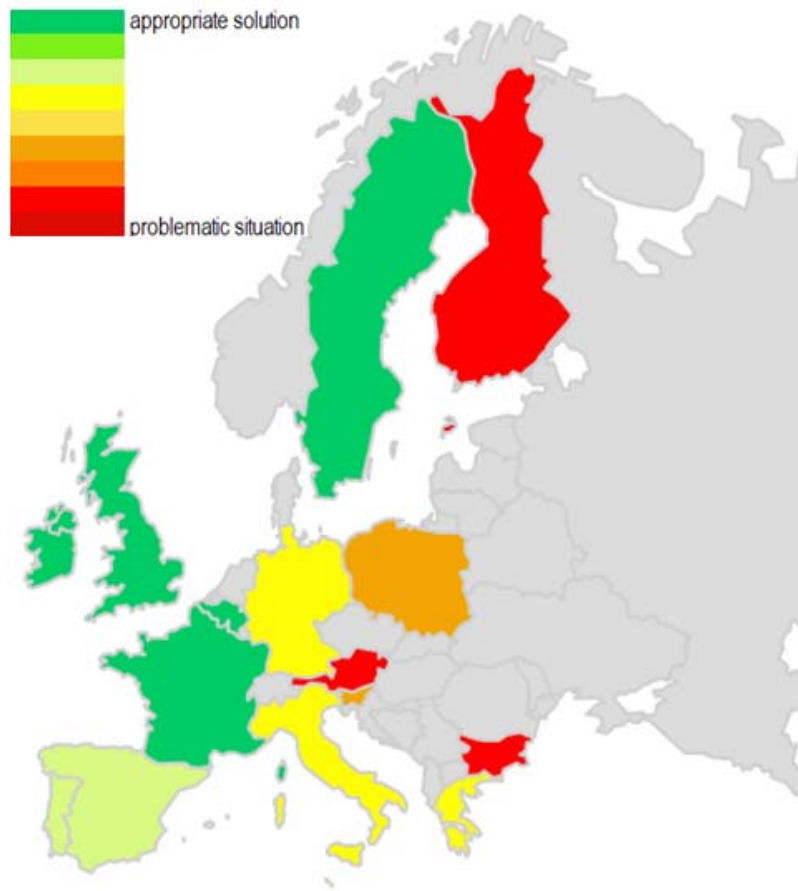


Figure 8: Flood - Map of the clusters based on available information

Table 4: Flood - Relevance of the risk and main conclusions

	A	B	C	D	E
	Is the peril relevant? (Historical data)	Is the peril relevant? (99th percentile)	Is the NatCat insurance bundled?	Penetration rate	Main Conclusions
BE	1	2	Y	90%	Moderate size of the risk. Appropriate solution.
BG	4	4	N	5%	Relevant risk. Should awareness among citizens be increased?
CZ	4	3	Y	50%	Relevant risk. Should awareness among citizens be increased?
DK	n.a.	3	Y	n.a.	Relevant risk according to the loss distribution.
DE	1	1	N	30%	Moderate size of the risk. <sup>20</sup>
EE	n.a.	4	n.a.	n.a.	Relevant risk according to the loss distribution. Lack of additional information.
IE	1	2	Y	90%	Moderate size of the risk. Appropriate solution
GR	1	1	N	5%	Moderate size of the risk. Should awareness among citizens be increased?
ES	1	1	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
FR	1	1	Y	90%	Moderate size of the risk. Appropriate solution.
IT	2	2	N	5%	Moderate size of the risk. Should awareness among citizens be increased?
CY	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	4	n.a.	n.a.	Relevant risk according to the loss distribution. Lack of additional information.
LT	n.a.	5	n.a.	n.a.	Relevant risk according to the loss distribution. Lack of additional information.
LU	1	6	N	5%	Moderate size of the risk but relevant risk according to the distribution. Should awareness among citizens be increased?
HU	2	4	n.a.	n.a.	Relevant risk according to the loss distribution. Lack of additional information
MT	n.a.	n.a.	n.a.	n.a.	n.a.
NL	1	2	F <sup>21</sup>	n.a.	Moderate size of the risk.
AT	3	4	N	18%	Relevant risk. Should awareness among citizens be increased?
PL	4	2	n.a.	50%	Moderate size of the risk. Should awareness among citizens be increased?
PT	2	1	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
RO	3	4	N <sup>22</sup>	n.a.	Relevant risk according to the loss distribution. Lack of additional information
SI	2	4	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
SK	1	6	Y	n.a.	Relevant size of the risk according to the loss distribution. Lack of additional information.
FI	n.a.	4	n.a.	18%	Relevant risk. Should awareness among citizens be increased?
SE	n.a.	2	n.a.	90%	Moderate size of the risk. Appropriate solution
UK	1	1 <sup>23</sup>	Y	90%	Moderate size of the risk. Appropriate solution

<sup>20</sup> In DE, campaigns aiming at increasing risk awareness in the Federal States are already under way or in different stages of preparation.

<sup>21</sup> Forbidden: flood is not insurable in NL but the Government reimburses in case of need.

<sup>22</sup> In RO flood insurance is compulsory for dwelling but it is not bundled to any other policy.

<sup>23</sup> We consider the 98<sup>th</sup> percentile because it is the only available percentile.

Table 5: Flood - Open issues for possible developments

	A	B	C	D	E
	Are there limits/ deductibles?	Risk - based	GVT intervention - Financial	GVT intervention - Non Financial	Open issues for possible developments
BE	Y	n.a.	Y	If insurance is not available on the market or if it is available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives. Regional authorities in Belgium have developed mathematical models in the area of water management; these models can be used with a view to simulating floods.	Appropriateness of limits/deductibles
BG	N	N	n.a.	n.a.	Introduction of risk-based premiums
CZ	Y	Y	Y*	An early warning system is in place but it is currently under revision. An emergency system is institutionalized in the law but it is under revision.	Appropriateness of limits/deductibles Appropriateness of Government <i>ex-post</i> intervention
DK	Y	N	Y	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums
DE	Y	Y	Y	n.a.	Appropriateness of limits/deductibles
EE	n.a.	n.a.	n.a.	n.a.	n.a.
IE	n.a.	Y	N	n.a.	n.a.
GR	Y	Y	n.a.	n.a.	Appropriateness of limits/deductibles
ES	Y	N	Y <sup>24</sup>	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums
FR	Y	N	Y	The state is in charge of setting additional premiums, establishing deductibles and declaring the state of natural catastrophe. Moreover, the state owns and backs the Casse Centrale de Réassurance (CCR).	Appropriateness of limits/deductibles Introduction of risk-based premiums
IT	n.a.	n.a.	Y*	n.a.	Appropriateness of Government <i>ex-post</i> intervention
CY	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.	n.a.
LU	n.a.	n.a.	n.a.	n.a.	n.a.
HU	n.a.	n.a.	Y	n.a.	n.a.
MT	n.a.	n.a.	n.a.	n.a.	n.a.
NL	N	N	Y	n.a.	Should not other solutions be discussed?
AT	Y	N	Y* <sup>25</sup>	Austrian Government has started the program "Flood risk zoning in Austria - HORA", whose main aim is to build an Austria-wide risk zoning system for natural hazards which focuses on floods.	Appropriateness of limits/deductibles Introduction of risk-based premiums Appropriateness of Government <i>ex-post</i> intervention
PL	n.a.	N	Y*	There are permanent acts providing for a more structured mechanism of state funding for victims' compensation. This system includes: assistance provided to the affected population and small and medium-sized businesses; reconstruction of infrastructure; construction of new infrastructures; modernization of flood protection systems.	Introduction of risk-based premiums Appropriateness of Government <i>ex-post</i> intervention
PT	Y	n.a.	n.a.	n.a.	Appropriateness of limits/deductibles
RO	Y	Y	Y*	n.a.	Appropriateness of limits/deductibles
SI	n.a.	n.a.	n.a.	n.a.	n.a.
SK	Y	n.a.	n.a.	n.a.	Appropriateness of limits/deductibles
FI	n.a.	n.a.	Y*	n.a.	Appropriateness of Government <i>ex-post</i> intervention
SE	N	N	n.a.	n.a.	Introduction of risk-based premiums
UK	Y	Y	N	n.a.	Appropriateness of limits/deductibles

<sup>24</sup> The Consorcio de Compensacion de Seguros manages NatCat coverage system using exclusively its own resources. The unlimited State guarantee is applied in the event of losses exceeding the Consorcio's capacity.

<sup>25</sup> If the Disaster Fund is not enough to cover losses, the Federal Government will provide additional funds in case of floods.

## 3.2 Storm

Table 7 summarizes the main information for storm.<sup>26</sup>

The ranges adopted to rank losses are summarized in Table 6. Ranges refer to percentages of GDP, as we have turned losses in % of GDP.

Table 6: Storm - ranges adopted to rank losses

	Thresholds
1	<0.335%
2	0.335% - 0.670%
3	0.670%- 1.005%
4	1.005% - 1.340%
5	1.340%- 1.675%
6	>1.675%

Using information in Table 7 the following clusters of MS can be attempted:

1. Cluster 1: BE, IE, AT, FI, and UK. In all these MS the NatCat insurance market seems to have efficiently developed, as total losses are not very high, while penetration rates are high. This could be mainly due to the fact in all these MS storm insurance is bundled with another base policy, usually fire and households insurances.
2. Cluster 2: FR and LU. In these MS the size of the risk is moderate and the penetration rate is high. This could be mainly due to the fact in these MS storm insurance is bundled with another base policy.
3. Cluster 3: CZ, ES and PT. Also in these MS the NatCat insurance market seems to be adequate because total losses are low. However, even if storm insurance is bundled to another policy, the rate of penetration is not that high (25% - 75).
4. Cluster 4: DE, NL, and PL. In these MS total losses are not very high, while penetration rates are high. In DE and NL however storm insurance is not bundled to any policy, but it can be bought as an optional extension of base policies.
5. Cluster 5: DK, SI and SE. In these MS the size of the risk is moderate and the penetration rate is high. In these MS however storm insurance is not bundled to any policy, but it can be bought as an optional extension of base policies.

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<sup>26</sup> The Table has the same structure as the one presented for flood. However, simulated loss distributions are not available for most MS and thus corresponding scores are not presented.



6. Cluster 6: BG, GR, IT and RO. In BG and RO no data on historical losses is available and the penetration rates of the storm insurance are very low (<10%). In GR and IT, even if the size of the risk is not relevant, the penetration rate is very low (<10%).

Figure 9 shows the map of the clusters.

The remaining MS have not been included in any of the above clusters, because of the lack of detailed information or because they have specific features. The impact of storms in these MS looks different: in some MS it seems relevant, like in LV or in EE, while in others it looks moderate, like in CY or LT.

As can be seen in column A of Table 8, limits and/or deductibles are in place in 10 MS out of 12 for which information is available.

5 MS (BG, ES, NL, AT, SE) do not apply risk-based premiums, as can be seen in column B of Table 8.

Column C of Table 8 summarizes all the MS where the Government is financially involved in storm insurance, while column D describes other public non-financial intervention. Except for IE and UK, where the state does not intervene, in all the other MS Government is, to different extents, involved. Financial interventions labeled as "Y\*" indicate that in the past *ex-post* interventions have been made by the Governments. We note that for storm *ex-post* Governments interventions can be associated with high penetration rates (NL, AT, PL).

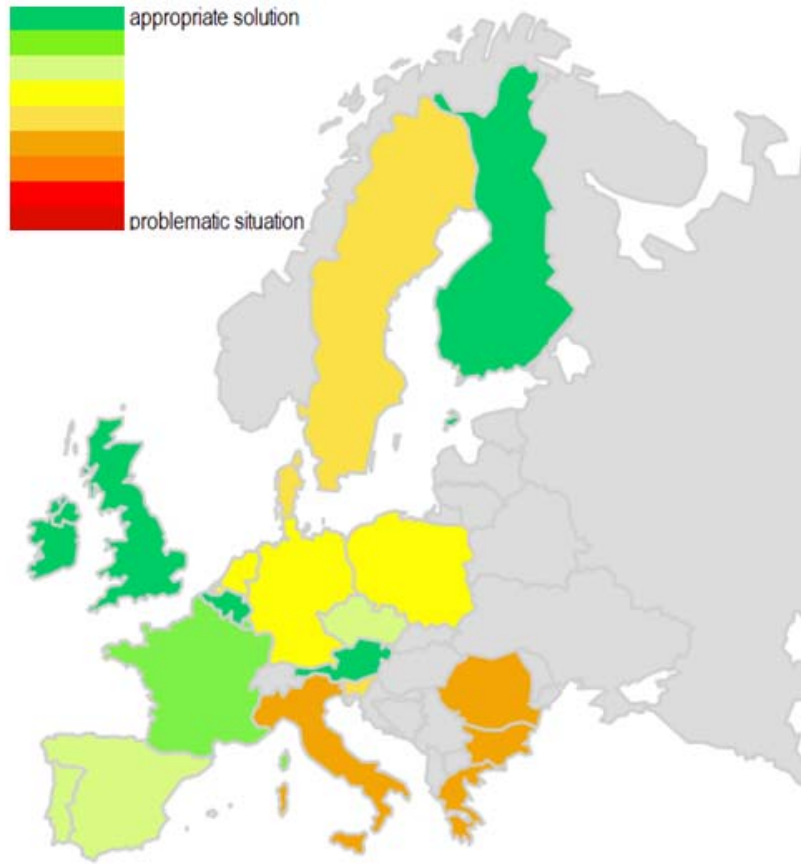


Figure 9: Storm - Map of the clusters based on available information



Table 7: Storm - Relevance of the risk and main conclusions

	A	C	D	E
	Is the risk relevant? (Historical data)	Is the NatCat insurance bundled?	Penetration rate	Main Conclusions
BE	1	Y	90%	Moderate size of the risk. Appropriate solution.
BG	n.a.	N	5%	Should awareness among citizens be increased?
CZ	1	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
DK	4	N	90%	Relevant risk. Appropriate solution.
DE	1	N	90%	Moderate size of the risk. Appropriate solution.
EE	3	n.a.	n.a.	Relevant risk. Lack of additional information.
IE	1	Y	90%	Moderate size of the risk. Appropriate solution.
GR	1	N	5%	Moderate size of the risk. Should awareness among citizens be increased?
ES	1	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
FR	3	Y	90%	Relevant risk. Appropriate solution.
IT	1	N	5%	Moderate size of the risk.
CY	1	n.a.	n.a.	Moderate size of the risk. Lack of additional information.
LV	6	n.a.	n.a.	Relevant risk. Lack of additional information.
LT	1	n.a.	n.a.	Moderate size of the risk. Lack of additional information.
LU	3	Y	90%	Relevant risk. Appropriate solution.
HU	1	Y	n.a.	Moderate size of the risk. Lack of additional information.
MT	n.a.	n.a.	n.a.	n.a.
NL	2	N	90%	Moderate size of the risk. Appropriate solution.
AT	1	Y	90%	Moderate size of the risk. Appropriate solution.
PL	1	n.a.	90%	Moderate size of the risk. Appropriate solution.
PT	1	Y	50%	Moderate size of the risk. Should awareness among citizens be increased?
RO	n.a.	n.a.	5%	Should awareness among citizens be increased?
SI	3	N	90%	Relevant risk. Appropriate solution.
SK	2	n.a.	n.a.	Moderate size of the risk. Lack of additional information.
FI	1	Y	90%	Moderate size of the risk. Appropriate solution.
SE	3	n.a.	90%	Relevant risk. Appropriate solution.
UK	2	Y	90%	Moderate size of the risk. Appropriate solution.

Table 8: Storm - Open issues for possible developments

	A	B	C	D	E
	Are there limits/ deductibles?	Risk - based	GVT intervention - Financial	GVT intervention - Non Financial	Open issues for possible developments
BE	Y	n.a.	Y	If insurance is not available on the market or if it is available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives.	Appropriateness of limits/deductibles
BG	N	N	n.a.	n.a.	Introduction of risk-based premiums
CZ	Y	Y	Y*	n.a.	Appropriateness of Government <i>ex-post</i> intervention
DK	Y	Y	N	n.a.	n.a.
DE	Y	Y	Y	n.a.	Appropriateness of limits/deductibles
EE	n.a.	n.a.	n.a.	n.a.	n.a.
IE	n.a.	Y	N	n.a.	n.a.
GR	Y	Y	n.a.	n.a.	Appropriateness of limits/deductibles
ES	Y	N	Y <sup>27</sup>	n.a.	Appropriateness of limits/deductibles
FR	n.a.	n.a.	N	n.a.	n.a.
IT	n.a.	n.a.	Y*	n.a.	Appropriateness of Government <i>ex-post</i> intervention
CY	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.	n.a.
LU	n.a.	n.a.	n.a.	n.a.	n.a.
HU	Y	n.a.	Y*	n.a.	Appropriateness of limits/deductibles Appropriateness of Government <i>ex-post</i> intervention
MT	n.a.	n.a.	n.a.	n.a.	n.a.
NL	Y	N	Y*	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums Appropriateness of Government <i>ex-post</i> intervention
AT	n.a.	N	Y <sup>28</sup>	n.a.	Appropriateness of Government <i>ex-post</i> intervention
PL	n.a.	n.a.	Y*	There are permanent acts providing for a more structured mechanism of state funding for the compensation to victims. This system includes various different measures, including: assistance provided to support the affected population and small and medium-sized businesses; reconstruction of infrastructure; construction of new infrastructures.	Appropriateness of Government <i>ex-post</i> intervention
PT	Y	n.a.	n.a.	n.a.	Appropriateness of limits/deductibles
RO	n.a.	n.a.	n.a.	n.a.	n.a.
SI	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.	n.a.
SE	N	N	n.a.	n.a.	Introduction of risk-based premiums
UK	Y	Y	N	n.a.	Appropriateness of limits/deductibles

<sup>27</sup> The Consorcio de Compensacion de Seguros manages NatCat coverage system using exclusively its own resources. The unlimited State guarantee is applied in the event of losses exceeding the Consorcio's capacity.

<sup>28</sup> If the Disaster Fund is not enough to cover losses, the Federal Government will provide additional funds in case of floods.

### 3.3 Earthquake

Information on earthquake is summarized in Table 10; as can be seen from the Table, information on insurance for earthquake is available for 17 MS and in some cases it is little.<sup>29</sup>

The ranges adopted to rank losses are summarized in Table 9. Ranges refer to percentages of GDP, as we have turned losses in % of GDP.

Table 9: Earthquake - ranges adopted to rank losses

	Thresholds
1	<0.1%
2	>=0.1%

Using information in Table 10 the following clusters of MS can be attempted:

1. Cluster 1: BE, IE, ES, FR, and UK. In all these MS the NatCat insurance market seems to have efficiently developed, as in BE, ES, and UK total losses are not very high, while penetration rates are high. Even if there is no information on past events, also situations in IE and FR seem to be adequate. This could be mainly due to the fact in all these MS earthquake insurance is bundled with another base policy, usually fire, personal accidents, life and property insurances.
2. Cluster 2: DE and SI. In these MS the earthquake risk appears low, the penetration rate is not that high and insurance is offered on the market as an optional extension of base policies.
3. Cluster 3: BG, AT, PT, and RO. Even if no quantitative data is reported for these MS, penetration rate is very low (<10%) and earthquake insurance is not bundled to any base policy in BG, PT, and RO.
4. Cluster 4: GR and IT. Situation in GR is rather crucial because earthquakes had relevant impacts in the past but the penetration rate is very low (<10%) and earthquake insurance is offered as an extension of fire insurance. Also situation in IT is rather crucial because earthquakes may have a relevant impact and insurance is offered only as an optional extension of other policies.

Figure 10 shows the map of the clusters.

NL is a special case because earthquake is not insurable but the Government reimburses in case of need.

<sup>29</sup> The Table has the same structure as the one presented for flood. However, simulated loss distributions are not available for most MS and thus corresponding scores are not presented.

Earthquakes in CY may have, according to historical data, a moderate impact.

In CZ no quantitative data is available and earthquake insurance is often bundled (though some insurers offer it as an optional extension) and the penetration rate is not that high.

The remaining MS have not been included in any of the above clusters, because of the lack of detailed information.

As can be seen in column A of Table 11, limits and/or deductibles are in place in 12 MS out of 13 for which information is available.

Risk-based premiums are applied in 6 MS (BG, DK, DE, IE, PT, RO), as can be seen in column B of Table 11.

Column C of Table 11 summarizes all the MS where the Government is financially involved in flood insurance, while column D describes other public non-financial intervention. Except for IE and UK, where the state does not intervene, in all the other MS it is, to different extents, involved. Financial interventions labeled as "Y\*" indicate that in the past *ex-post* interventions have been made by the Governments.

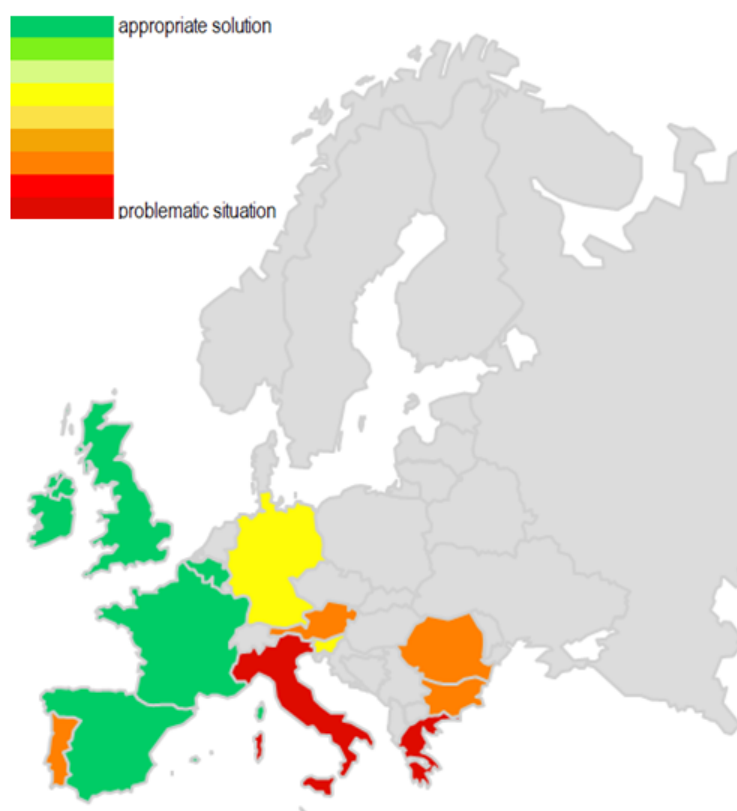


Figure 10: Earthquake - Map of the clusters based on available information

Table 10: Earthquake - Relevance of the risk and main conclusions

	A	C	D	E
	Is the risk relevant? (Historical data)	Is the NatCat insurance bundled?	Penetration rate	Main Conclusions
BE	1	Y	90%	Moderate size of the risk. Appropriate solution.
BG	n.a.	N	5%	Should awareness among citizens be increased?
CZ	n.a.	N	50%	Should awareness among citizens be increased?
DK	n.a.	N	n.a.	n.a.
DE	1	N	18%	Moderate size of the risk. Should awareness among citizens be increased? <sup>30</sup>
EE	n.a.	n.a.	n.a.	n.a.
IE	n.a.	Y	90%	Appropriate solution.
GR	2	N	5%	Relevant risk. Should awareness among citizens be increased?
ES	1	Y	90%	Moderate size of the risk. Appropriate solution.
FR	n.a.	Y	90%	Appropriate solution.
IT	2	N	5%	Relevant risk. Should awareness among citizens be increased?
CY	1	n.a.	n.a.	Moderate size of the risk. Lack of additional information.
LV	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.
LU	n.a.	n.a.	n.a.	n.a.
HU	n.a.	n.a.	n.a.	n.a.
MT	n.a.	n.a.	n.a.	n.a.
NL	1	F <sup>31</sup>	n.a.	Moderate size of the risk.
AT	n.a.	n.a.	5%	Should awareness among citizens be increased?
PL	n.a.	n.a.	n.a.	n.a.
PT	n.a.	N	5%	Should awareness among citizens be increased?
RO	n.a.	N <sup>32</sup>	5%	Should awareness among citizens be increased?
SI	1	N	50%	Moderate size of the risk. Should awareness among citizens be increased?
SK	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.
SE	n.a.	n.a.	90%	Appropriate solution.
UK	1	Y	90%	Moderate size of the risk. Appropriate solution.

<sup>30</sup> In DE, campaigns aiming at increasing risk awareness in the Federal States are already under way or in different stages of preparation.

<sup>31</sup> Forbidden: earthquake is not insurable in NL but the Government reimburses in case of need.

<sup>32</sup> In RO earthquake insurance is compulsory for dwelling but it is not bundled to any other policy.



Table 11: Earthquake - Open issues for possible developments

	A	B	C	D	E
	Are there limits/deductibles?	Risk - based	GVT intervention - Financial	GVT intervention - Non Financial	Open issues for possible developments
BE	Y	n.a.	Y	If insurance is not available on the market or if it available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives.	Appropriateness of limits/deductibles
BG	Y	Y	n.a.	n.a.	Appropriateness of limits/deductibles
CZ	Y	n.a.	N	n.a.	Appropriateness of limits/deductibles
DK	Y	Y	N	n.a.	n.a.
DE	Y	Y	Y	n.a.	Appropriateness of limits/deductibles
EE	n.a.	n.a.	n.a.	n.a.	n.a.
IE	n.a.	Y	N	n.a.	n.a.
GR	Y	n.a.	n.a.	n.a.	Appropriateness of limits/deductibles
ES	Y	N	Y <sup>33</sup>	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums
FR	Y	N	Y	The state is in charge of setting additional premiums, establishing deductibles and declaring the state of natural catastrophe. Moreover, the state owns and backs the Casse Centrale de Réassurance (CCR).	Appropriateness of limits/deductibles Introduction of risk-based premiums
IT	n.a.	n.a.	Y*	n.a.	Appropriateness of Government <i>ex-post</i> intervention
CY	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.	n.a.
LU	n.a.	n.a.	n.a.	n.a.	n.a.
HU	n.a.	n.a.	n.a.	n.a.	n.a.
MT	n.a.	n.a.	n.a.	n.a.	n.a.
NL	N	N	Y	n.a.	Should not other solutions be discussed?
AT	Y	N	Y* <sup>34</sup>	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums Appropriateness of Government <i>ex-post</i> intervention
PL	n.a.	n.a.	Y*	There are permanent acts providing for a more structured mechanism of state funding for the compensation to victims. This system includes various different measures, including: assistance provided to support the affected population and small and medium-sized businesses; reconstruction of infrastructure; construction of new infrastructures.	Appropriateness of Government <i>ex-post</i> intervention
PT	Y	Y	n.a.	n.a.	Appropriateness of limits/deductibles
RO	Y	Y	Y	n.a.	Appropriateness of limits/deductibles
SI	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.	n.a.
SE	Y	N	n.a.	n.a.	The introduction of risk-based premiums could be discussed.
UK	Y	N	N	n.a.	Appropriateness of limits/deductibles Introduction of risk-based premiums

<sup>33</sup> The Consorcio de Compensacion de Seguros manages NatCat coverage system using exclusively its own resources. The unlimited State guarantee is applied in the event of losses exceeding the Consorcio's capacity.

<sup>34</sup> If the Disaster Fund is not enough to cover losses, the Federal Government will provide additional funds in case of earthquake.

### 3.4 Drought

Information on drought is summarized in Table 13; as can be seen from the Table, little information is available.<sup>35</sup> The ranges adopted to rank losses are summarized in Table 12; ranges refer to percentages of GDP, as we have turned losses in % of GDP.

Table 12: Drought - ranges adopted to rank losses

	Ranges
1	<0.1%
2	0.1% - 0.65%
3	>0.65%

In FR the adopted solution seems to be appropriate though past events had a high impact. This could be mainly due to the fact in FR drought insurance is bundled with another base policy. In SE as well situation might be appropriate because the penetration rate is high, although no quantitative data is available. In ES situation seems to be rather burdensome because the risk is moderate and the penetration rate is low. Also in the other MS situation is troublesome because the risk could have a relevant impact and the rate of penetration is low.

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<sup>35</sup> The Table has the same structure as the one presented for flood. However, simulated loss distributions are not available for most MS and thus corresponding scores are not presented.



Table 13: Drought - Relevance of the risk and main conclusions

	A	C	D	E
	Is the risk relevant? (Historical data)	Is the NatCat insurance bundled?	Penetration rate	Main Conclusions
BE	n.a.	n.a.	n.a.	n.a.
BG	n.a.	n.a.	n.a.	n.a.
CZ	n.a.	n.a.	5%	Should awareness among citizens be increased?
DK	2	n.a.	n.a.	Relevant risk. Lack of additional information.
DE	n.a.	n.a.	n.a.	n.a.
EE	n.a.	n.a.	n.a.	n.a.
IE	n.a.	n.a.	n.a.	n.a.
GR	2	n.a.	n.a.	Relevant risk. Lack of additional information.
ES	2	n.a.	5%	Moderate size of the risk. Should awareness among citizens be increased?
FR	3	Y	90%	Relevant risk. Appropriate solutions.
IT	1	n.a.	n.a.	Moderate size of the risk. Lack of additional information.
CY	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.
LT	3	n.a.	n.a.	Relevant risk. Lack of additional information.
LU	n.a.	n.a.	n.a.	n.a.
HU	2	n.a.	n.a.	Relevant risk. Lack of additional information.
MT	n.a.	n.a.	n.a.	n.a.
NL	n.a.	n.a.	n.a.	n.a.
AT	n.a.	n.a.	18%	Should awareness among citizens be increased?
PL	n.a.	n.a.	n.a.	n.a.
PT	3	n.a.	n.a.	Relevant risk. Lack of additional information.
RO	3	n.a.	n.a.	Relevant risk. Lack of additional information.
SI	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.
SE	n.a.	n.a.	90%	Appropriate solution.
UK	n.a.	n.a.	n.a.	n.a.

Table 14: Drought - Open issues for possible developments

	A	B	C	D	E
	Are there limits/deductibles?	Risk - based	GVT intervention - Financial	GVT intervention - Non Financial	Open issues for possible developments
BE	n.a.	n.a.	n.a.	n.a.	n.a.
BG	n.a.	n.a.	n.a.	n.a.	n.a.
CZ	n.a.	n.a.	n.a.	n.a.	n.a.
DK	n.a.	n.a.	n.a.	n.a.	n.a.
DE	n.a.	n.a.	n.a.	n.a.	n.a.
EE	n.a.	n.a.	n.a.	n.a.	n.a.
IE	n.a.	n.a.	n.a.	n.a.	n.a.
GR	n.a.	n.a.	n.a.	n.a.	n.a.
ES	n.a.	n.a.	n.a.	n.a.	n.a.
FR	Y	N	Y	The state is in charge of setting additional premiums, establishing deductibles and declaring the state of natural catastrophe. Moreover, the state owns and backs the Casse Centrale de Réassurance (CCR).	Appropriateness of limits/deductibles Introduction of risk-based premiums
IT	n.a.	n.a.	n.a.	n.a.	n.a.
CY	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.	n.a.
LU	n.a.	n.a.	n.a.	n.a.	n.a.
HU	n.a.	n.a.	n.a.	n.a.	n.a.
MT	n.a.	n.a.	n.a.	n.a.	n.a.
NL	n.a.	n.a.	n.a.	n.a.	n.a.
AT	n.a.	n.a.	n.a.	n.a.	n.a.
PL	n.a.	n.a.	n.a.	n.a.	n.a.
PT	n.a.	n.a.	n.a.	n.a.	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.
SI	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.	n.a.
SE	n.a.	n.a.	n.a.	n.a.	n.a.
UK	n.a.	n.a.	n.a.	n.a.	n.a.

## 4 Conclusions

The focus of the present exercise was on insurance practices for flood, storm, earthquake, and drought. For each of these Natural Catastrophes (NatCat) we have collected both qualitative and quantitative information from a number of different sources. For every EU MS we have processed all available information with the goal of describing the size of the NatCat and detail existing practices of insurance systems. The collected information had the purpose to create clusters of MS facing similar problems and to identify open issues concerning insurance systems in place. For the first goal quantitative information on the size of economic losses related to each NatCat was analyzed. For the second goal these data were combined with other available information on bundling practices, pricing approaches and role of Government in the various countries.

When developing the present exercise, the major issue was the collection of quantitative data and qualitative information on insurance for NatCat from publicly available sources. Quantitative data in some cases were missing and different sources provided for different estimates of total losses referring to the same event and/or year. The scarcity of quantitative data has forced us to use data coming from different sources to exploit the available information at most, despite data from different sources might be estimated using different criteria.

The conclusions presented below are based on available data; greater access to NatCat data could improve the robustness of the exercise.

### 4.1 Flood

- The situation is very heterogeneous among MS. For example, in BE, IE, FR and UK the NatCat insurance market seems to have developed efficiently, while according to the collected information BG, AT and FI could face potential problems.
- Penetration rates are not very high in most MS for which information is available. The only MS where the rate of penetration is high are those where flood insurance is bundled to another policy.

### 4.2 Storm

- The situation is very heterogeneous among MS. For example, in BE, IE, AT, FI and UK the NatCat insurance market seems to have developed efficiently, while BG IT, GR and RO could face potential problems.
- Penetration rates are quite high in most MS for which information is available.

### 4.3 Earthquake

- The situation is very heterogeneous among MS, although little information is available. For example, in BE, ES, and UK the NatCat insurance market seems to have developed efficiently, while in GR and IT the risk could have a relevant impact.
- Penetration rates are low in many of the MS for which information is available, especially in those where the risk is more relevant (like in GR). Rates are high only in those MS where earthquake insurance is bundled to another policy.

### 4.4 Drought

- Little information is available; according to available information, drought seems to have a moderate impact on MS.
- Penetration rate is in most cases low.

### 4.5 General comments

- Based on available information, results on how financial *ex-post* interventions by the Governments influence penetration rates are mixed: while for flood *ex-post* Governments interventions are associated with medium-low penetration rates, for storm penetration rates of MS with *ex-post* Government interventions can be high. In well-developed systems such as BE, ES, and FR, high penetration rates are associated with Governments having a clearly defined role (different from *ad-hoc ex-post* financial reimbursements) in NatCat management.
- In many cases high penetration rates are associated with NatCat insurance bundled with other policies; however, we have observed counterexamples where penetration rates are high but NatCat insurance is sold only as an extension of other policies.
- In some cases drawing general conclusions on the NatCat market on the basis of a single NatCat is reductive since we have observed MS where dedicated markets are in place only for some risks but not for others. For instance in LU and FI, storm and flood insurance markets have developed to different extents. This could be driven by the role of Government and/or by the historical relevance of the risks.
- The adoption of risk-based premiums might be considered because they might reduce the moral hazard and might lead to a better understanding of the development of risk.

## **Annex I: Quantitative data per MS**

This Annex reports for each MS and each NatCat a table with historical data on total losses and graphs of the loss distributions where available.



## Belgium

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		769 575		
1991				
1992			108 882	
1993	20 021			
1994				
1995		101 680		
1996				
1997				
1998	11 380	569		
1999		59 757		
2000				
2001				
2002		6 245		
2003				
2004				
2005				
2006				
2007		351 066		
2008				
2009				
2010	179 638	120 691		

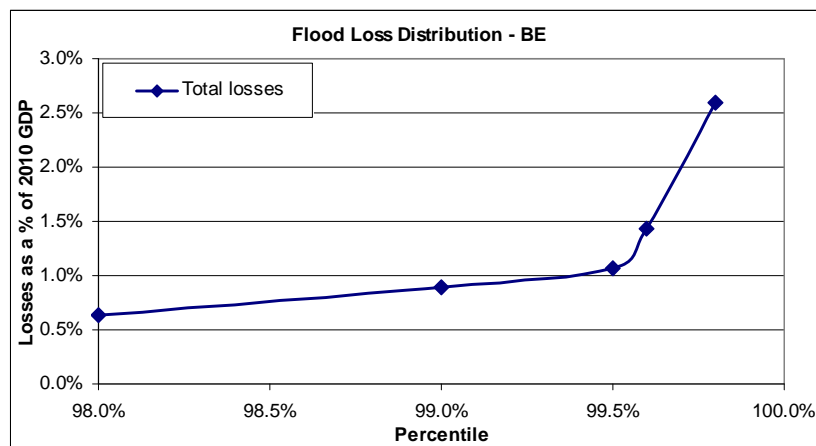


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Bulgaria

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002	1 664			
2003				
2004				
2005	553 510			
2006				
2007				
2008				
2009				
2010				

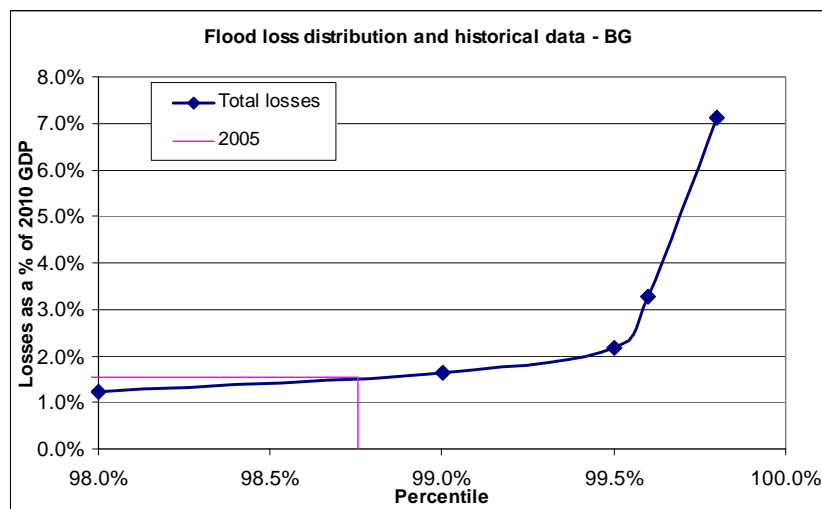


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Czech Republic

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996	44 636			
1997	2 377 667			
1998	61 634			
1999				
2000	108 754			
2001				
2002	2 916 146	25 045		
2003				
2004				
2005				
2006	212 586			
2007		118 421		
2008		34 617		
2009	155 664			
2010	262 171			

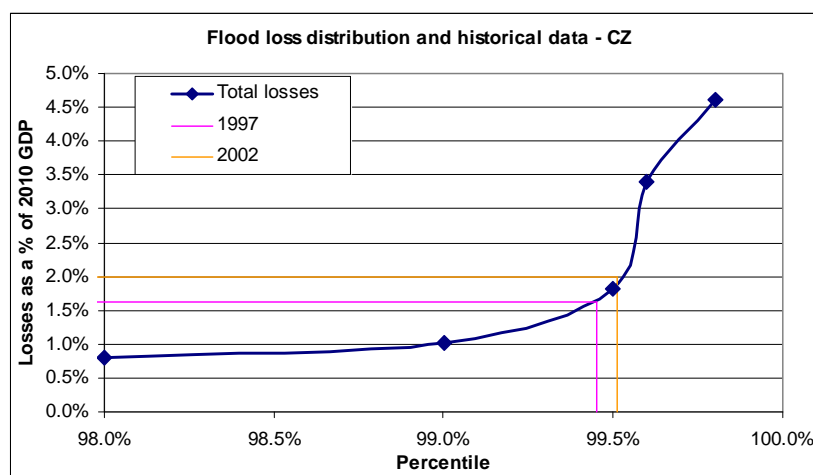


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Denmark

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				814 853
1993				
1994				
1995				
1996				
1997				
1998				
1999		3 048 782		
2000				
2001				
2002				
2003				
2004				
2005		1 157 881		
2006				
2007		78 081		
2008				
2009				
2010				

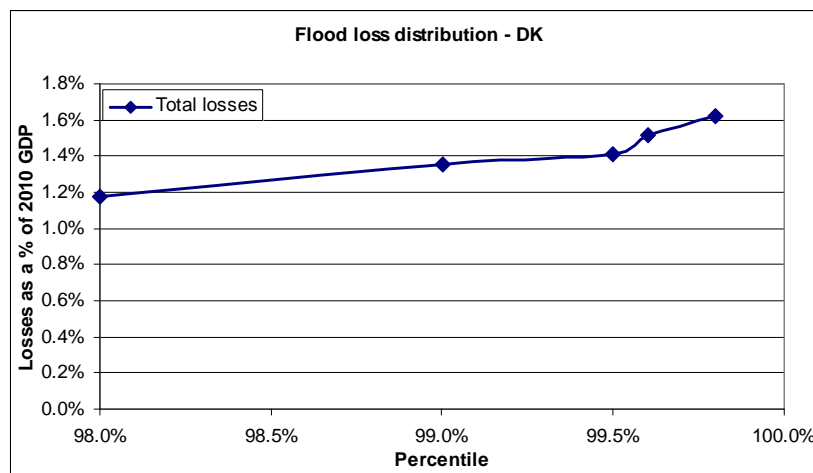


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Germany

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		3 486 646		
1991		4 035		
1992	23 188		38 518	
1993	512 383	350 128		
1994	330 806	878 674		
1995		501 390		
1996		482		
1997	382 609			
1998		160 297		
1999	398 723	1 954 728		
2000				
2001		385 925		
2002	12 119 192	2 464 373		
2003		298 387		
2004		115 519	9 832	
2005	184 741	235 366		
2006				
2007		2 590 428		
2008		1 480 598		
2009	14 504	36 260		
2010		754 318		

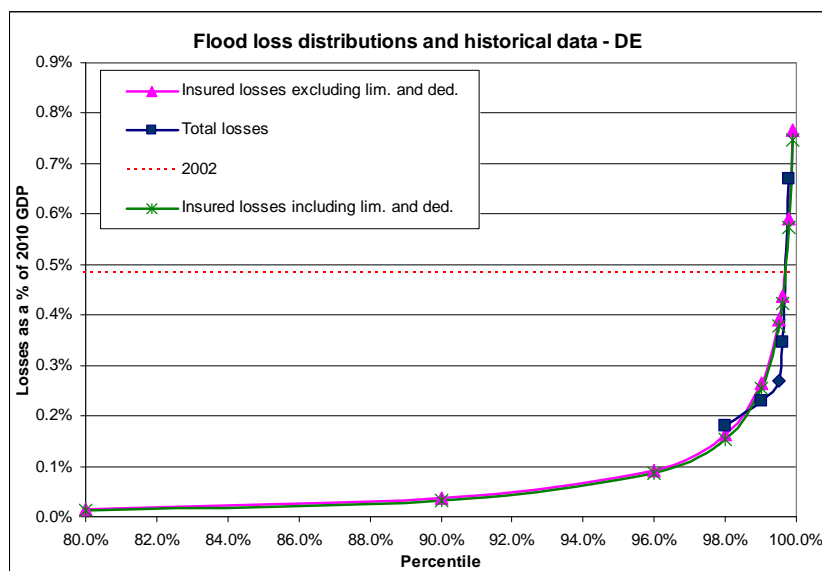


Figure 1: Simulated distribution of total losses (Source DG CLIMA) and of insured losses (Aon Benfield)

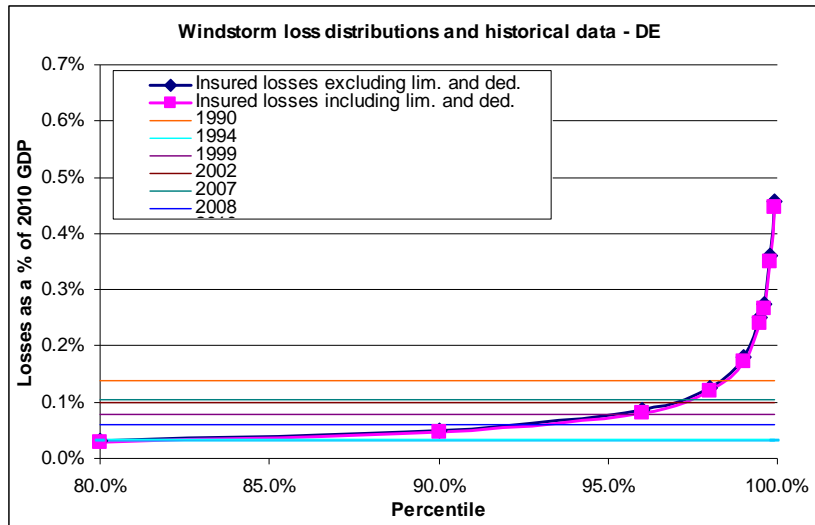


Figure 2: Simulated distributions of insured losses (Aon Benfield)

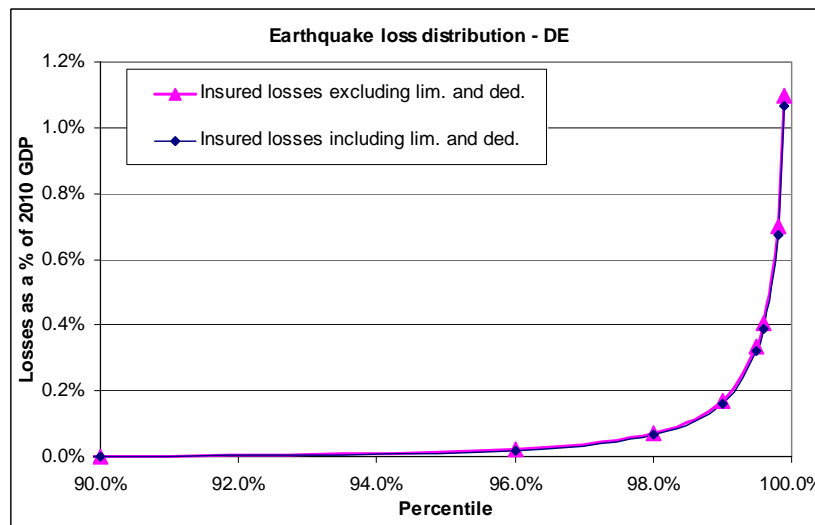


Figure 3: Simulated distributions of insured losses (Aon Benfield)

## Estonia

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005		132 651		
2006				
2007				
2008				
2009				
2010				

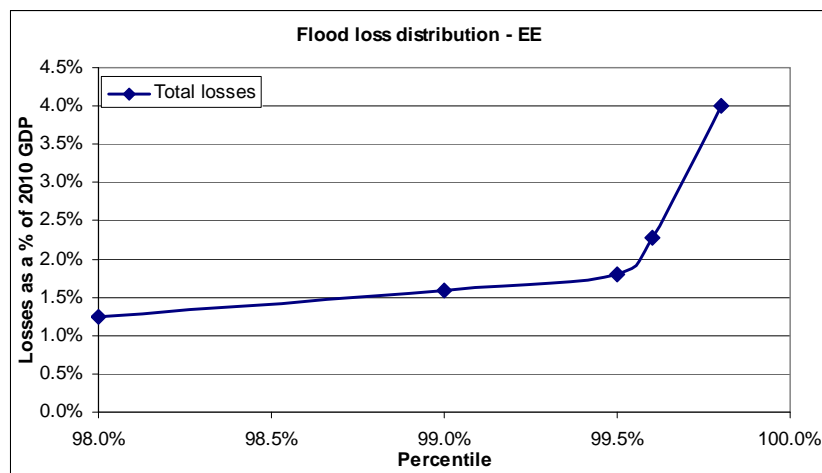


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Ireland

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		86 381		
1991		3 228		
1992				
1993	32 451			
1994				
1995				
1996		1 096		
1997				
1998		60		
1999		123 211		
2000		135 084		
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

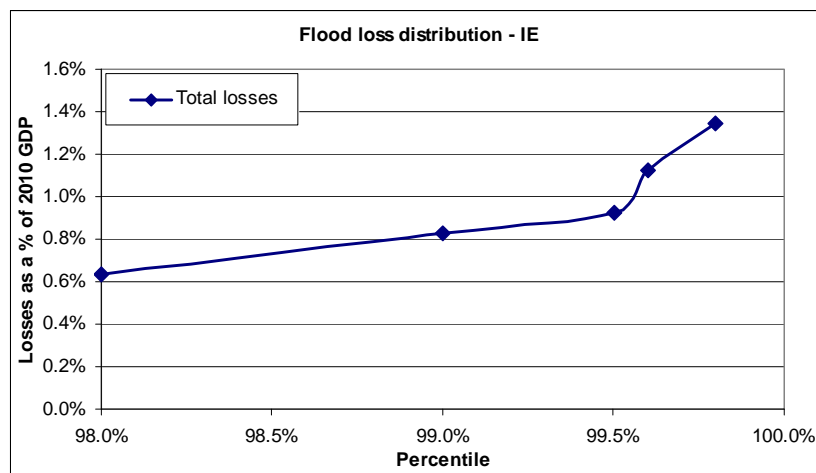


Figure 1: Simulated distribution of total losses (Source DG CLIMA)



## Greece

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				785 281
1991				
1992				
1993				
1994	699 891			
1995			1 165 338	
1996				
1997	216 673			
1998				
1999			4 834 321	
2000				
2001				
2002				
2003	673 041			
2004		332 879		
2005				
2006	217 203			
2007				
2008				
2009				
2010				

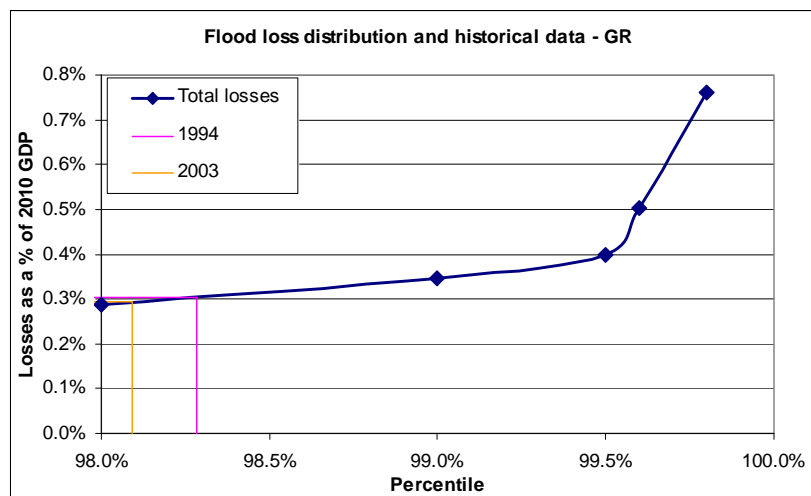


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Spain

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				3 533 763
1991				
1992				
1993				
1994				
1995				
1996	657 952			
1997		6 271		
1998		1 247		
1999		128 260	56 440	4 104 335
2000	107 269			
2001		103 278		
2002	114 101			
2003				
2004	13 404			
2005				
2006				
2007	312 859			
2008				
2009		1 390 027		
2010		256 468		

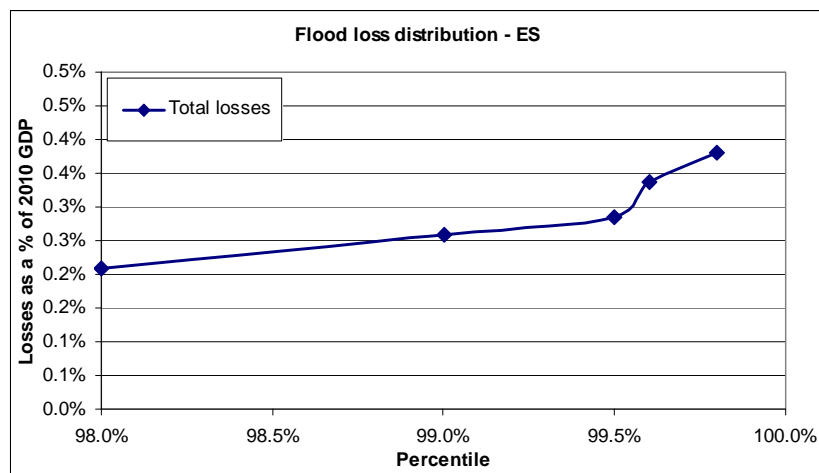


Figure 1: Simulated distribution of total losses (Source DG CLIMA).

## France

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		2 154 993		
1991				
1992		418 052		
1993	680 136	623 458		
1994	109 687			
1995		685 960		
1996	5 933	10		
1997				10 932
1998		164 768		
1999	572 244	13 787 714		
2000				
2001	174 609			
2002	1 264 561	1 226		
2003	1 552 183	50		22 500 000
2004				
2005				
2006				
2007		191 640		
2008		55 393		
2009		2 334 053		
2010	1 131 478	3 190 767		

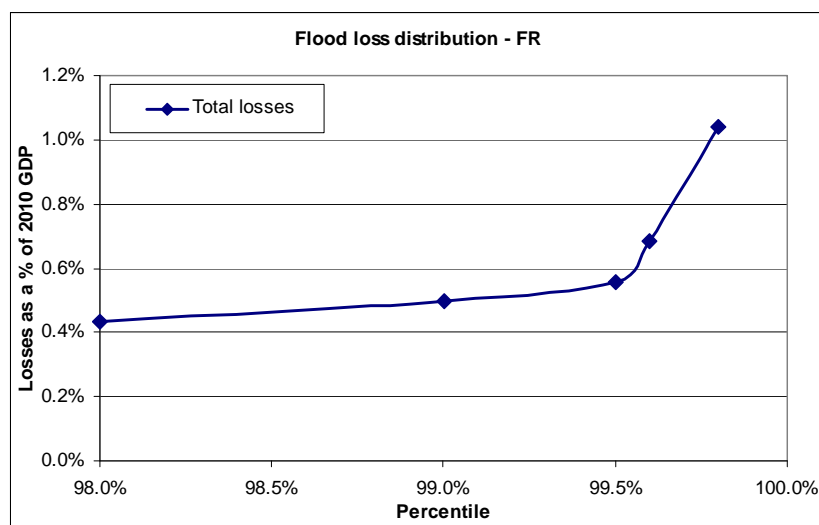


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Italy

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		28 241	706 014	
1991				
1992	866 243			
1993		823 538		
1994	11 579 987			
1995				
1996	34 065			
1997	506 749		9 886 953	935 817
1998	1 125 204		1 025 041	
1999	803 595		3 839	
2000	10 873 635		209 577	
2001	261 912	238 225	68 273	
2002	1 605 725		1 849 193	
2003	1 652 250		267 020	
2004				
2005				
2006				
2007				
2008	242 898			
2009	14 574		6 410 879	
2010	1 000 000	657 766		

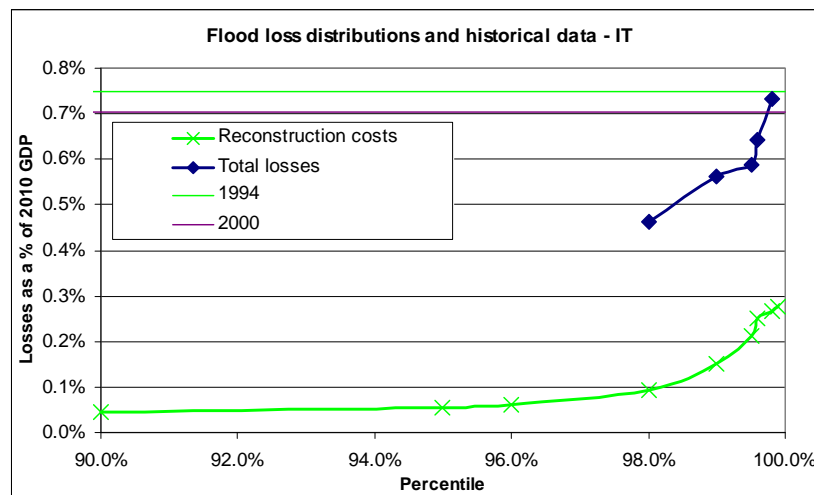


Figure 1: Simulated distribution of total losses (Source DG CLIMA) and reconstruction costs (Source ANIA (2011))

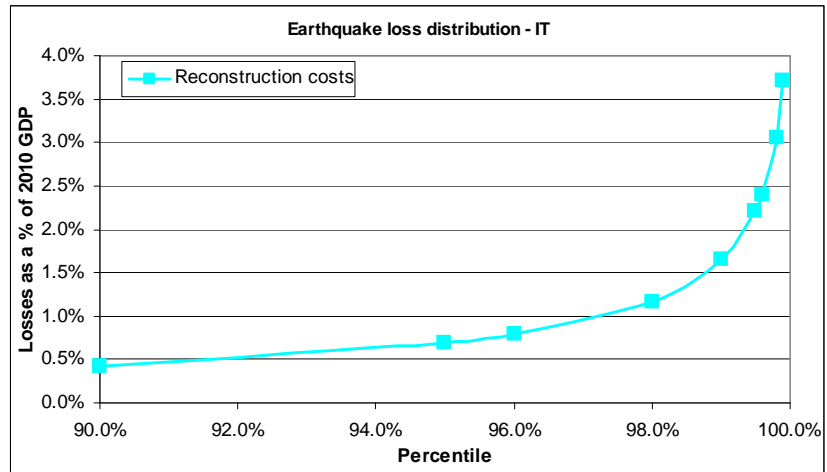


Figure 2: Simulated distribution of reconstruction costs (Source ANIA (2011))

## Cyprus

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995			3 318	
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003		10 297		
2004				
2005				
2006				
2007				
2008				
2009				
2010				

## Latvia

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999		811		
2000				
2001				
2002				
2003				
2004				
2005		360 261		
2006				
2007				
2008				
2009				
2010				

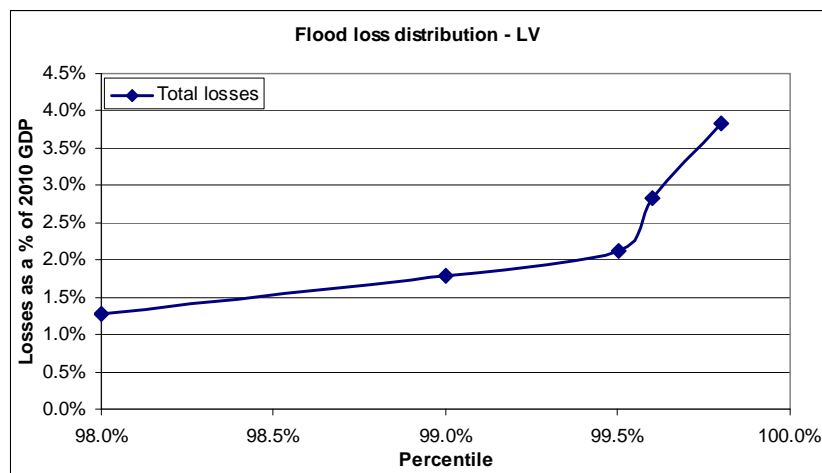


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Lithuania

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				40 752
1993				
1994				
1995				
1996				
1997				
1998				
1999		638		
2000				
2001				
2002				
2003				
2004				
2005		31 010		
2006				222 600
2007				
2008				
2009				
2010				

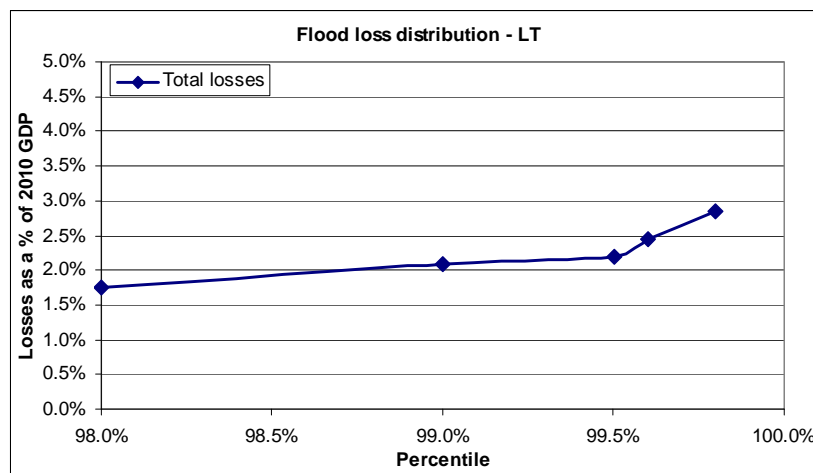


Figure 1: Simulated distribution of total losses (Source DG CLIMA)



## Luxembourg

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		290 554		
1991				
1992				
1993	8 540			
1994				
1995		10 776		
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010		23 384		

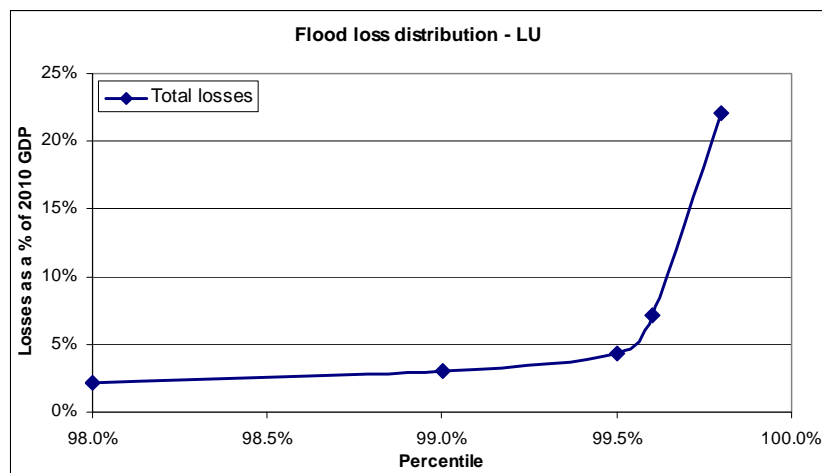


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Hungary

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				295 817
1993				
1994				
1995				
1996				
1997	20 973			
1998				
1999	521 279			
2000	102 551			
2001	8 814			
2002	47 592			
2003				126 686
2004				
2005	50 039			
2006	617 873	9 929		
2007				
2008				
2009				
2010	331 900			

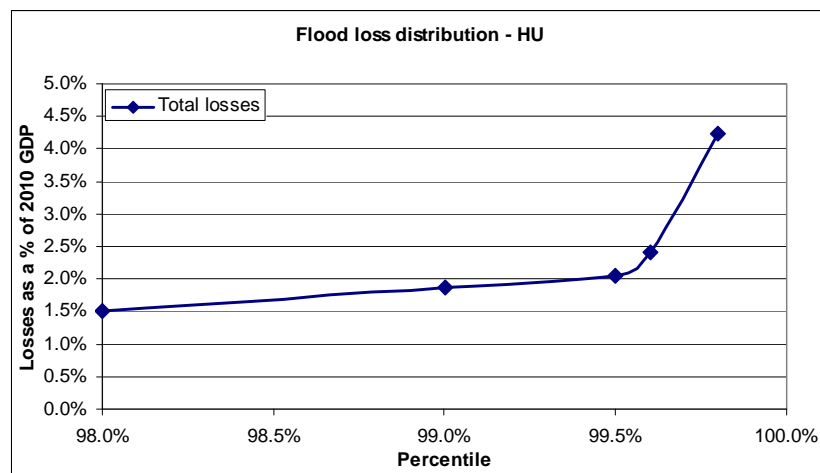


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Netherlands

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		2 080 616		
1991				
1992	30 347		100 000	
1993	89 285			
1994		2 312		
1995	63 000	1 223 714		
1996				
1997				
1998	504 943	115		
1999				
2000				
2001				
2002		359 008		
2003				
2004				
2005				
2006				
2007		418 032		
2008				
2009				
2010		21 121		

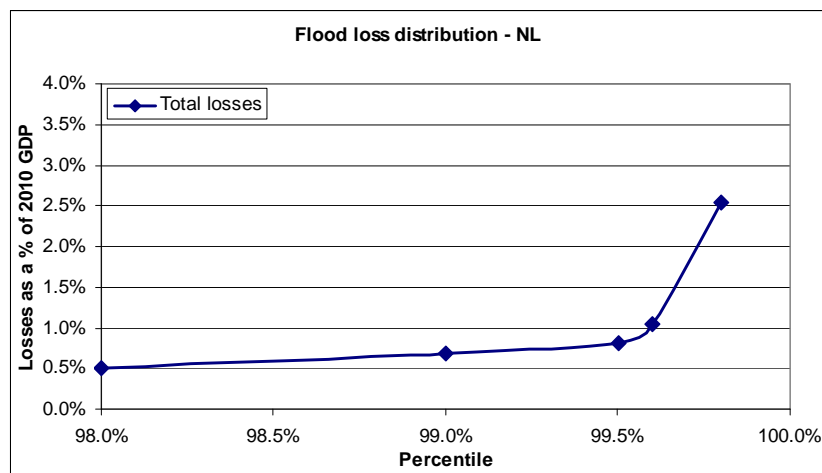


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Austria

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		288 181		
1991	94 237	32 179		
1992				
1993		1 139		
1994		2 184		
1995	195			
1996	4 946			
1997	191 593			
1998				
1999	36 783			
2000		26 019		
2001				
2002	3 215 448	6 107		
2003				
2004				
2005	599 594			
2006				
2007		307 608		
2008		313 549		
2009	145 816	364 540		
2010				

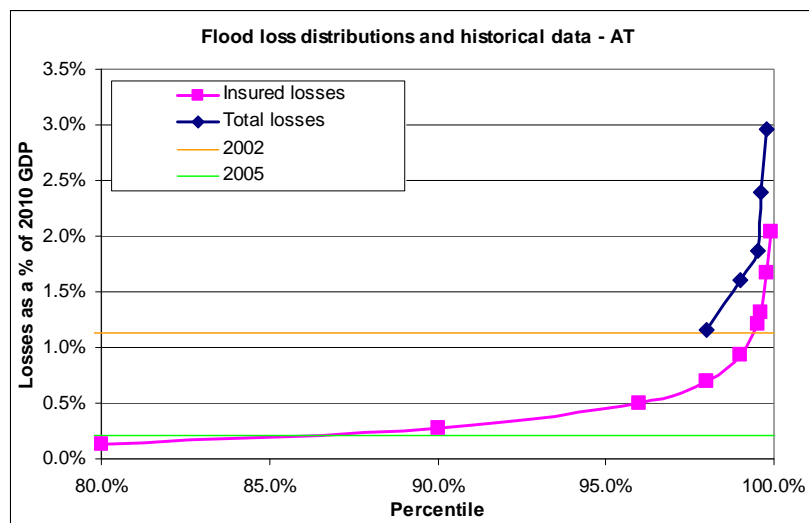


Figure 1: Simulated distribution of total losses (Source DG CLIMA) and of insured losses (Aon Benfield)

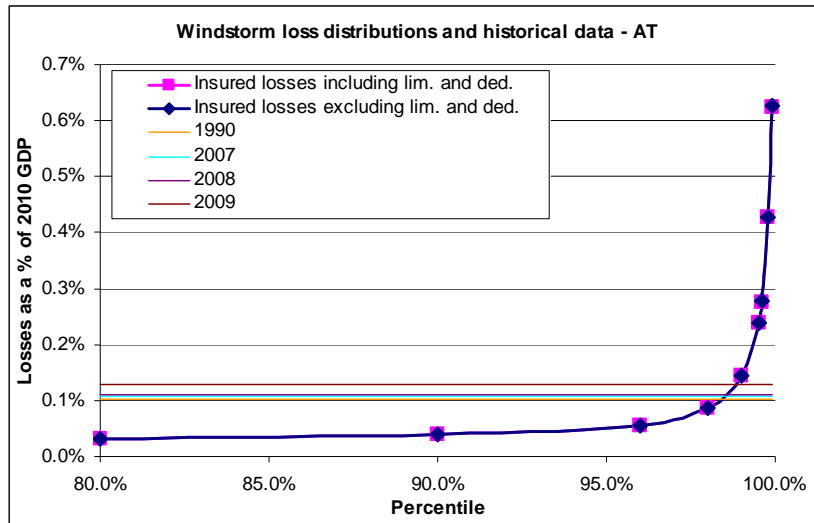


Figure 2: Simulated distributions of insured losses (Aon Benfield)

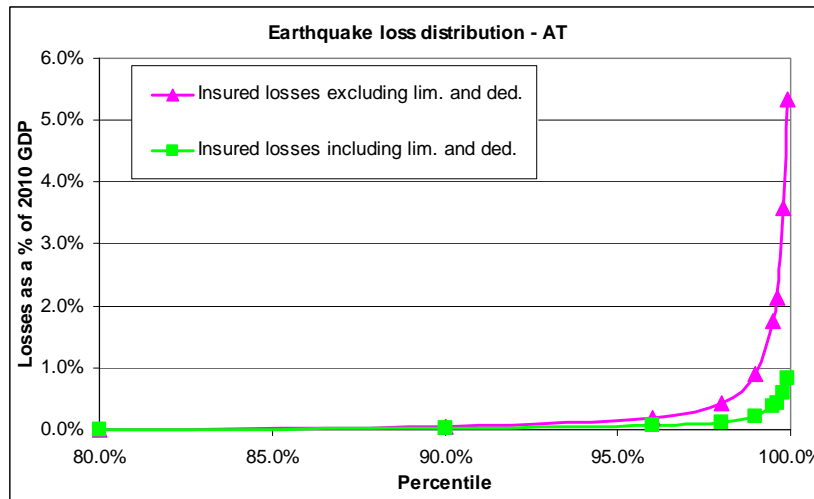


Figure 3: Simulated distributions of insured losses (Aon Benfield)

## Poland

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997	5 383 768			
1998				
1999		13 659		
2000				
2001	906 567			
2002		195		
2003				
2004				
2005				
2006				
2007		81 153		
2008		36 290		
2009	165 134			
2010	2 323 301			

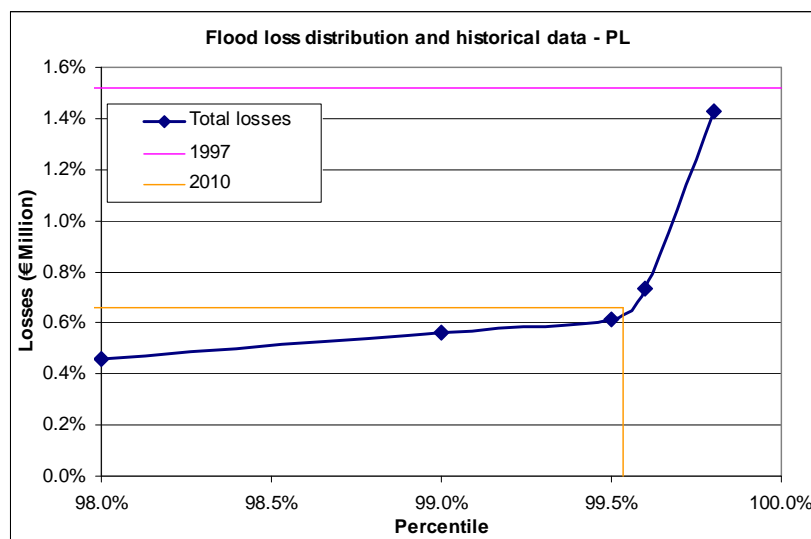


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Portugal

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996	14 266			
1997		30 147		12 059
1998				
1999				
2000				
2001				
2002				
2003				
2004				1 195 885
2005				
2006				
2007				
2008				
2009				
2010	1 018 330	203 666		

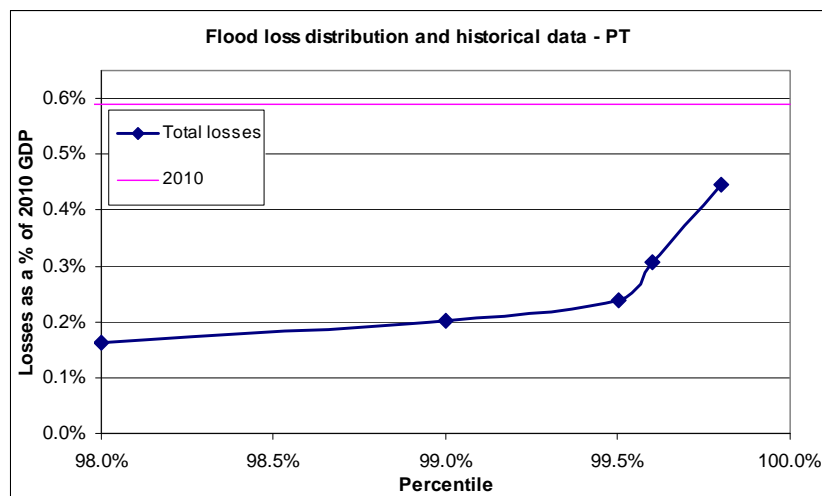


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Romania

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991	40 350			
1992				
1993				
1994	2 522			
1995	97 355			
1996				
1997	1 026 934			
1998	572 440			
1999	256 910			
2000	340 867			1 695 856
2001	591 365			
2002	583			
2003				
2004				
2005	1 399 812			
2006				
2007				
2008	466 729			
2009				
2010				

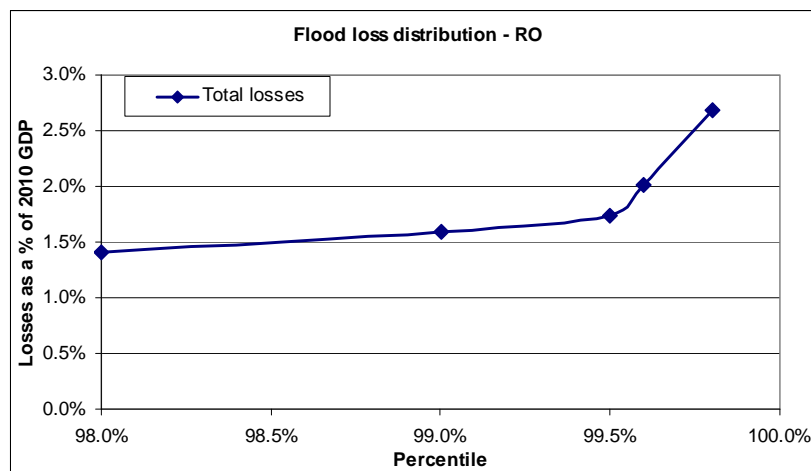


Figure 1: Simulated distribution of total losses (Source DG CLIMA)



## Slovenia

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004			8 762	
2005	4 647			
2006				
2007	250 140	310 836		
2008				
2009				
2010				

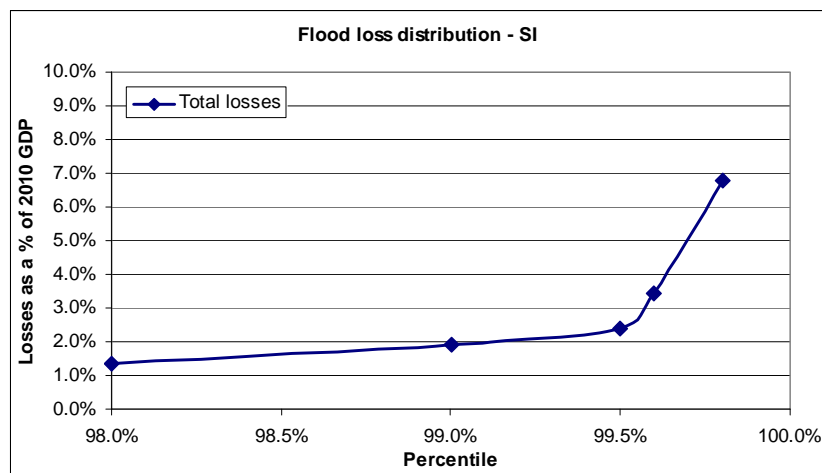


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Slovakia

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997	104 281			
1998	62 250			
1999	177 804			
2000				
2001	9 320			
2002	4 265			
2003				
2004		338 504		
2005				
2006				
2007				
2008				
2009				
2010	18 858			

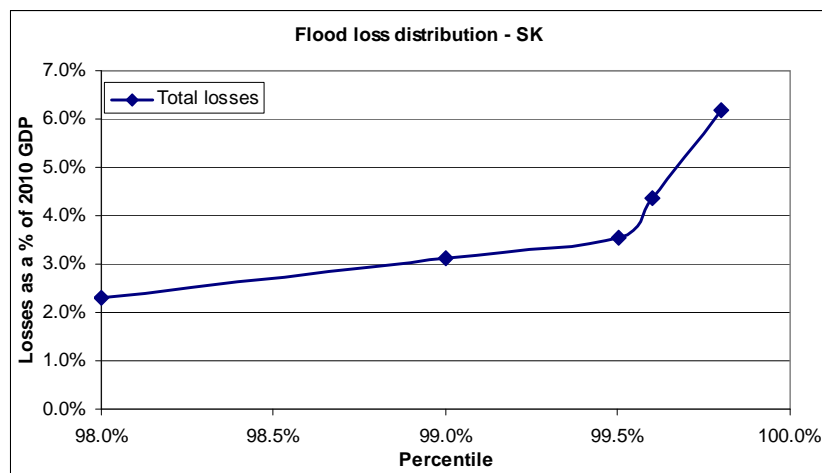


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## Finland

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		11 429		
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

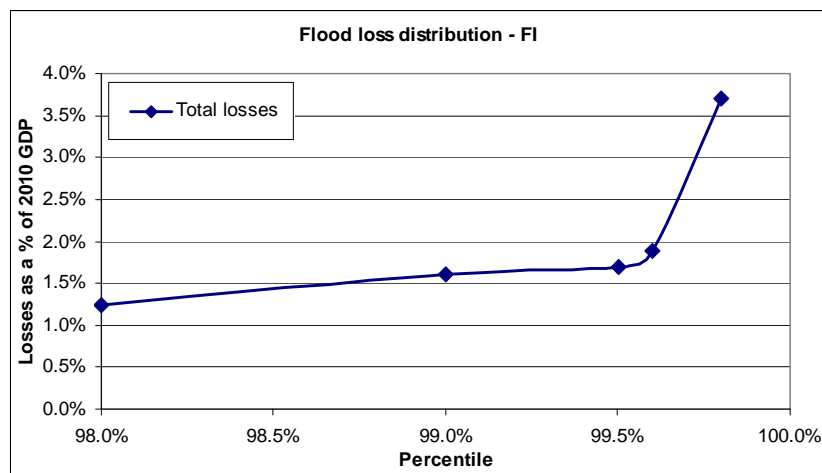


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

# Sweden

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		12 244		
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999		183 787		
2000				
2001				
2002				
2003				
2004				
2005		2 493 640		
2006				
2007				
2008				
2009				
2010				

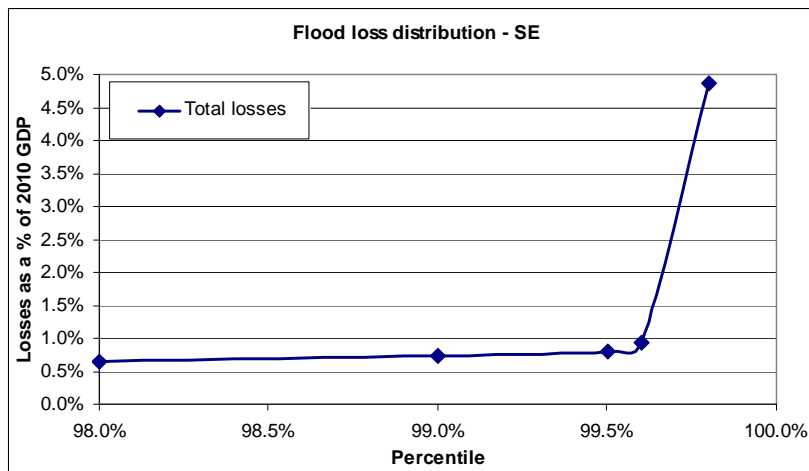


Figure 1: Simulated distribution of total losses (Source DG CLIMA)

## United Kingdom

Table 1: Historical data on total losses (for sources see country fiches in Annex II)

year	Total losses Flood (t€)	Total losses Storm (t€)	Total losses Earthquake (t€)	Total losses Drought (t€)
1990		6 031 045		
1991		1 082 892		
1992				
1993	222 780			
1994	271 411			
1995		661 754		
1996		306 934		
1997	279 583			
1998	491 320	1 530 246		
1999	38 018	117 497		
2000	3 571 905	1 997 979		
2001				
2002		349 714		
2003				
2004	402 664			
2005	398 138	423 625		
2006				
2007	5 448 836	957 316	47 866	
2008	2 152			
2009	296 689			
2010		377		

Table 2: Simulated distributions of flood total losses (source DG CLIMA) and of flood insured losses (source ABI (2009))

Percentile	Total losses (t€)	Insured Losses (t€)
98.0%	2 800 000	
99.0%		5 277 600
99.5%		7 491 620

Table 3: Simulated distributions of storm insured losses (source ABI (2009))

Percentile	Insured Losses (t€)
99.0%	8 048 841
99.5%	10 886 188

## Annex II: Country fiches

This Annex will include country fiches for each NatCat, covering the next information, where available. Information comes from the documents cited at the bottom of each table and from exchange of information with stakeholders.

Type of information	Action
<b>Definition</b>	Define when insurance schemes intervenes to cover losses caused by natural catastrophes
<b>Compensation limits</b>	Describe the limits, if any
<b>Bundling</b>	Describe if insurance products against <i>NatCat</i> are combined with other products
<b>Pricing</b>	Describe pricing practices of insurance companies
<b>Provisioning Practices</b>	Describe whether provisioning practices are in place in the MS
<b>Insurability Problems? Adverse Selection</b>	Describe if there exist any insurability problems of citizens exposed to risk
<b>Public Intervention</b> - Non financial - Financial	Describe the intervention, if any.
<b>Financing - Description</b>	Describe financial interventions, e.g. if there exist any public funds for the purpose and how payments are defined

## Belgium - Flood

Type of information	Action
Definition	Flood: overflow of water courses, canals, lakes, ponds or seas following atmospheric precipitations, melting snow/ice, broken dykes or tsunamis.
Compensation limits	<p>Deductibles. The maximum deductible is fixed at € 610 (indexed to the consumer price index). As of September, 2005: € 1,088.81; as of November 2010: € 1,114.45.</p> <p>Insurers' Limits. An insurer may limit total indemnification to the lower of the two sums obtained with the following formulas: a) € 2,000,000+0.45*P+.005*S b) € 2,000,000+1.05*0.45*P Where P=premium and surcharge revenues for guarantee of fire, electricity and related simple-risk guarantees implemented by the insurer in the financial year prior to that of claim; S=amount of indemnification owed by the insurer for a natural catastrophe. The amount € 2,000,000 is indexed (ABEX index)</p> <p>Caisse Nationale des Calamites limits. The Caisse Nationale des Calamites takes up losses covered beyond the above limits. Its interventions are ceiled to € 280 million. Beyond those ceilings, indemnifications are reduced proportionally.</p>
Bundling	All new fire insurance contracts issued to <u>simple risks</u> must also cover the risk of natural catastrophes. Mandatory rules define the risks covered and the indemnification criteria.
Pricing	<p>The insurers are covering the natural catastrophes at their own premium and deductible terms.</p> <p>In the case of property for which there is no cover on the market, or for which cover is available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives.</p>
Provisioning Practices	Insurers are allowed to create tax-free provisions to meet potential non-recurring losses and special risks that could occur.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Regional authorities in Belgium have developed mathematical models in the area of water management; these models can be used with a view to simulating floods.
Financing - Description	
Other	<p>Definition of <u>simple risk</u>: any property or group of properties whose insured value do not exceed € 743,680.57 (the limit raises to € 23,921,725.14 for certain properties).</p> <p>The Caisse Nationale des Calamites is managed by the deputy head of the Treasury under the authority of the Minister of Finance. The Caisse Nationale des Calamites is financed from the Minister of Finance's budget.</p>

Sources: OECD (2008); CCS (2008); Caisse Nationale des Calamités web page

## Belgium - Storm

Type of information	Action
Definition	Storm: winds of more than 100km/h or significant damage over a 10km radius.
Compensation limits	<p>Deductibles. The maximum deductible is fixed at € 610 (indexed to the consumer price index). As of September, 2005: € 1,088.81; as of November 2010: € 1,114.45.</p> <p>Insurers' Limits. An insurer may limit total indemnification to the lower of the two sums obtained with the following formulas: c) € 2,000,000+0.45*P+.005*S d) € 2,000,000+1.05*0.45*P Where P=premium and surcharge revenues for guarantee of fire, electricity and related simple-risk guarantees implemented by the insurer in the financial year prior to that of claim; S=amount of indemnification owed by the insurer for natural catastrophes. The amount € 2,000,000 is indexed (ABEX index)</p> <p>Caisse Nationale des Calamites limits. The Caisse Nationale des Calamites takes up losses covered beyond the above limits. Its interventions are ceiled to € 280 million. Beyond those ceilings, indemnifications are reduced proportionally.</p>
Bundling	All new fire insurance contracts issued to <u>simple risks</u> must also cover the risk of natural catastrophes. Mandatory rules define the risks covered and the indemnification criteria.
Pricing	<p>The insurers are covering the natural catastrophes at their own premium and deductible terms.</p> <p>In the case of property for which there is no cover on the market, or for which cover is available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives.</p>
Provisioning Practices	Insurers are allowed to create tax-free provisions to meet potential non-recurring losses and special risks that could occur.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	<p>Definition of <u>simple risk</u>: any property or group of properties whose insured value do not exceed € 743,680.57 (the limit raises to € 23,921,725.14 for certain properties).</p> <p>The Caisse Nationale des Calamites is managed by the deputy head of the Treasury under the authority of the Minister of Finance.</p> <p>The Caisse Nationale des Calamites is financed from the Minister of Finance's budget..</p>

Sources: OECD (2008); CCS (2008); Caisse Nationale des Calamités web page



## Belgium - Earthquake

Type of information	Action
Definition	Earthquake: minimum magnitude of 4 degrees on the Richter Scale and damages within a 10 km radius.
Compensation limits	<p>Deductibles. The maximum deductible is fixed at € 610 (indexed to the consumer price index). As of September, 2005: € 1,088.81; as of November 2010: € 1,114.45.</p> <p>Insurers' Limits. An insurer may limit total indemnification to the lower of the two sums obtained with the following formulas: e) € 2,000,000+1.2*P+.005*S f) € 2,000,000+1.05*1.2*P Where P=premium and surcharge revenues for guarantee of fire, electricity and related simple-risk guarantees implemented by the insurer in the financial year prior to that of claim; S=amount of indemnification owed by the insurer for natural catastrophes. The amount € 2,000,000 is indexed (ABEX index)</p> <p>Caisse Nationale des Calamites limits. The Caisse Nationale des Calamites takes up losses covered beyond the above limits. Its interventions are ceiled to € 700 million. Beyond those ceilings, indemnifications are reduced proportionally.</p>
Bundling	All new fire insurance contracts issued to <u>simple risks</u> must also cover the risk of natural catastrophes. Mandatory rules define the risks covered and the indemnification criteria.
Pricing	The insurers are covering natural catastrophes at their own premium and deductible terms. In the case of property for which there is no cover on the market, or for which cover is available only at excessively high prices, a Bureau de Tarification is created to specify the rating terms for such risks. The premiums and claims related to risks using this mechanism to set their tariffs are distributed among all insurers operating in simple-risk fire cover in Belgium. The Bureau de Tarification comprises members from the insurance sector and consumers' representatives.
Provisioning Practices	Insurers are allowed to create tax-free provisions to meet potential non-recurring losses and special risks that could occur.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	<p>Definition of <u>simple risk</u>: any property or group of properties whose insured value do not exceed € 743,680.57 (the limit raises to € 23,921,725.14 for certain properties).</p> <p>The Caisse Nationale des Calamites is managed by the deputy head of the Treasury under the authority of the Minister of Finance.</p> <p>The Caisse Nationale des Calamites is financed from the Minister of Finance's budget.</p>

Sources: OECD (2008); CCS (2008); Caisse Nationale des Calamités web page

## Bulgaria - Flood

Type of information	Action
Definition	
Compensation limits	No
Bundling	Flood risk coverage is offered as an extension in basic homeowners policies.
Pricing	The average yearly household insurance premium is around € 50 and the additional cost for flood coverage is around € 20. Tariffs are usually flat but some companies use premium loadings depending on the flood maps or proximity to rivers and other water basins.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Catastrophe retentions of local companies are quite small, around 3% of the risk, while the rest of the risk is ceded to international reinsurers.
Other	BG is in the process of introducing a more advanced insurance system for flood coverage.

Sources: Guy Carpenter (2005); World Bank (2008)

## Bulgaria - Storm

Type of information	Action
Definition	
Compensation limits	No
Bundling	Storm risk coverage is offered as an extension in basic homeowners policies.
Pricing	The average yearly household insurance premium is around € 50 and the additional cost for storm coverage is around € 20. Tariffs are usually flat.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Catastrophe retentions of local companies are quite small, around 3% of the risk, while the rest of the risk is ceded to international reinsurers.
Other	BG is in the process of introducing a more advanced insurance system for storm coverage.

Sources: World Bank (2008)

## Bulgaria - Earthquake

Type of information	Action
Definition	
Compensation limits	Deductibles do not exceed 2% of the sum insured, even if some companies do not apply any deductible. Policies usually cover up to 85% of the sum insured.
Bundling	Earthquake risk coverage is offered as an extension to fire policies.
Pricing	The average yearly household insurance premium is around € 50 and the additional cost for earthquake coverage is around € 20. Premiums are mostly risk-based because they are computed according to hazard maps provided by Munich Re or Swiss Re. These maps divide BG into 3 or 4 zones, depending on their risk exposure. Some local insurance companies apply flat tariffs.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Catastrophe retentions of local companies are quite small, around 3% of the risk, while the rest of the risk is ceded to international reinsurers.
Other	BG is in the process of introducing a more advanced insurance system for earthquake coverage.

Sources: World Bank (2008)

## Czech Republic - Flood

Type of information	Action
Definition	
Compensation limits	Some contracts have a compensation limit.
Bundling	Flood risk coverage is generally an extension of property insurance policies. Some insurance companies offer policies that include all risks.
Pricing	Some insurance companies use a risk zoning system to assess the premiums.
Provisioning Practices	There are no special technical provisions for NatCat.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	In case of losses not covered by private insurance, ad-hoc compensation has often been made available ex-post by the State. An early warning system is in place but it is currently under revision. An emergency system is institutionalized in the law but it is under revision.
Financing - Description	Flood risk coverage is marketed on a voluntary basis.

Sources: CEA (2009); OECD (2003(a)); OECD (2008)

## Czech Republic - Storm

Type of information	Action
Definition	
Compensation limits	Full value coverage for household policies
Bundling	Coverage is usually bundled within a base policy.
Pricing	Some insurance companies use a risk zoning system to assess the premiums.
Provisioning Practices	There are no special technical provisions for NatCat.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	In case of losses not covered by private insurance, ad-hoc compensation has often been made available ex-post by the State.
Financing - Description	Storm risk coverage is marketed on a voluntary basis

Sources: CEA (2009); Guy Carpenter (2007); OECD (2003(a)); OECD (2008)

## Czech Republic - Earthquake

Type of information	Action
Definition	
Compensation limits	Some contracts have compensation limits
Bundling	Insurance is often bundled though some insurers offer it as an optional extension.
Pricing	
Provisioning Practices	There are no special technical provisions for NatCat.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Up to now, only moderate damages occurred and there was no need for government intervention. Individual help of municipalities to citizens in difficult situations is possible.
Financing - Description	Earthquake risk coverage is marketed on a voluntary basis
Other	Earthquake risk is relevant only for well defined and relatively small regions.

Sources: CEA (2009); Guy Carpenter (2007)

## Denmark - Flood

Type of information	Action
Definition	<p>The flooding must meet the following conditions:</p> <ul style="list-style-type: none"> <li>- It must be caused by seawater;</li> <li>- The invasion of sea-water must have been caused by a manifest rise in the sea level as the result of a cyclonic event.</li> </ul> <p>The Storm Council is in charge of judging whether the intervention after a given event is necessary or not.</p>
Compensation limits	<p>There is a deductible of the minimum between 5% and 5,000 DKK (around € 700 as of 2010) for single or two-family homes and for personal effects, and of the minimum between 10% and 10,000 DKK (around € 1 350 as of 2010) for all the other properties.</p> <p>Exclusions:</p> <ul style="list-style-type: none"> <li>- Movable and real property when it is generally possible to cover them against flood damage with any authorized company</li> <li>- Movable and real property covered against flood damage by other insurance</li> <li>- The content of basement, cellars and underground premises</li> <li>- Indirect damage</li> <li>- Damage to land</li> <li>- Personal damage.</li> </ul> <p>Indemnifications may be reduced if the damage is caused in buildings such that:</p> <ul style="list-style-type: none"> <li>- they were built in areas known in advance to contain serious risk;</li> <li>- they contributed to or aggravated the damage because they did not observe the Danish building legislation.</li> </ul> <p>Persons who have suffered damage as a result of flooding may be required to take preventive measures if they are to continue to be entitled to compensation.</p>
Bundling	The surcharge is added to the fire policy.
Pricing	Non risk-based.
Provisioning Practices	The Danish legislation does not allow insurers to create tax-free provisions to deal with any fluctuations in claims for damage arising from natural catastrophes.
Insurability Problems? Adverse Selection	DK has experienced damages generated by prolonged heavy rainfalls that have led to flooding of streams and lakes: these damages are not covered by insurance (they can be covered by private insurers). Therefore the Storm council is considering whether to insure or not this type of damage.
Public Intervention - Non financial - Financial	The seawater flood cover is State-guaranteed and must be included in all fire insurance policies (except for cars and boats). It is administered by the Storm Council, a State body whose members are appointed by the Ministry of Economic and Business Affairs.
Financing - Description	The flood indemnification plan is funded by an annual charge of DKK 20, added to the premiums for all fire insurance policies (excluding cars and boats), and other insurance covering flood damage. The charge is collected by the insurers, who transfer the sums to the Storm Council on a monthly basis. Should the fund collected by the Council for the 20 DKK (ex-ante surcharge) prove to be insufficient to cover a loss, the State, through the Ministry of Economic and Business Affairs, will additionally contribute a limited guarantee of DKK 200 million to the System. The State will recover this amount with an extra DKK 10 supplement to be added to the charge following the loss (ex-post surcharge).

Sources: CCS (2008); CEA (2005); CEA (2011(b))



## Denmark - Storm

Type of information	Action
Definition	
Compensation limits	They depend upon the policies.
Bundling	Bundling is applied in some cases, depending on the policy.
Pricing	Risk-based
Provisioning Practices	The Danish legislation does not allow insurers to create tax-free provisions to deal with any fluctuations in claims for damage arising from natural catastrophe.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Storm coverage is optional and it is traded in a varied range of policies.

Sources: CCS (2008); CEA (2005), exchange of information with representatives of FERMA (Federation of European Risk Management Associations)

## Denmark - Earthquake

Type of information	Action
Definition	
Compensation limits	They depend upon the policies.
Bundling	Coverage is offered as an optional extension.
Pricing	Risk-based
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Sources: exchange of information with representatives of FERMA (Federation of European Risk Management Associations)

## Germany - Flood

Type of information	Action
Definition	Inundation of the soil of the insured premises with considerable quantities of surface water due to: - overflow of surface(stagnant or running) waters; - heavy rain (torrential rain); - escape of groundwater to the surface due to overflow or intense precipitation.
Compensation limits	There are no standard deductibles.
Bundling	They depend on the type of insurance contract. It usually is an optional part of home insurance.
Pricing	There are no standard premium rates. Private companies can compute the premiums on the basis of zoning systems, which take into account the exposure of the region and the respective risks. There are 4 risk zones.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Germany has provided, in some cases, ex-post compensation to victims of specific disaster events. Now it does not pay any subsidies any more but it gives loans to victims at low interest rates. Loans are intended to ridge time until claim settlements by the insurances are done. <sup>36</sup>
Financing - Description	

Sources: Botzen and Bergh (2008); CCS (2008); GDV (2010); Guy Carpenter (2005); OECD (2003(b)); OECD (2008)

<sup>36</sup> See: <http://www.mdr.de/sachsen-anhalt/unwetter264.html> , <http://www.sachsen-anhalt.de/index.php?id=51474> and [http://amt24.sachsen.de/ZFinder/verfahren.do.jsessionid=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2\\_2?action=showdetail&islandesimpressum=false&modul=VB&id=429615!0](http://amt24.sachsen.de/ZFinder/verfahren.do.jsessionid=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2_2?action=showdetail&islandesimpressum=false&modul=VB&id=429615!0)

## Germany - Storm

Type of information	Action
Definition	Weather-induced air movement of at least wind force 8 according to Beaufort (wind speed at least 62km/h). If wind force cannot be ascertained for the loss location, wind force 8 is assumed, provided the policyholder proves that: <ul style="list-style-type: none"> <li>- the air movement has caused damage in the surroundings of the insured premises to buildings having been in good order and condition or to other property that is at least as resistant, or that</li> <li>- the damage can only have been caused by storm because of the insured building or the building in which the insured objects have been located or other buildings structurally connected to this building having been in good order and condition.</li> </ul>
Compensation limits	There are no standard deductibles.
Bundling	They depend on the type of insurance contract. It usually is an optional part of home insurance.
Pricing	There are no standard premium rates. Private companies can compute the premiums on the basis of zoning systems, which take into account the exposure of the region and the respective risks.
Provisioning Practices	Insurance companies are required to create an equalization reserve which is endowed yearly with a sum equal to 3.5% of its maximum amount. The amount is calculated as being 4.5 or 6 (depending on the risk) the standard deviation of the loss ratio on commercial premiums, multiplied by said premium. In order to benefit from tax exemptions, endowment of the reserve must meet the following criteria: <ul style="list-style-type: none"> <li>- the mean of the premium of the last three years must be above € 125 000</li> <li>- standard deviation in the loss ratio over the last 15 years must be greater than 5%</li> <li>- loss ratio plus expenses must exceed 100% at least once in 15 years.</li> </ul>
Insurability Problems? Adverse Selection	
Public Intervention <ul style="list-style-type: none"> <li>- Non financial</li> <li>- Financial</li> </ul>	Germany has provided, in some cases, ex-post compensation to victims of specific disaster events. Now it does not pay any subsidies any more but it gives loans to victims at low interest rates. Loans are intended to ridge time until claim settlements by the insurances are done. <sup>37</sup>
Financing - Description	

Sources: CCS (2008); GDV (2010); OECD (2008)

<sup>37</sup> See: <http://www.mdr.de/sachsen-anhalt/unwetter264.html> , <http://www.sachsen-anhalt.de/index.php?id=51474> and [http://amt24.sachsen.de/ZFinder/verfahren.do?sessionId=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2\\_2?action=showdetail&islandesimpresum=false&modul=VB&id=42961510](http://amt24.sachsen.de/ZFinder/verfahren.do?sessionId=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2_2?action=showdetail&islandesimpresum=false&modul=VB&id=42961510)

## Germany - Earthquake

Type of information	Action
Definition	Naturally-caused movement of the earth's crust triggered by geophysical processes in the earth's interior. Earthquake is assumed if the policyholder proves that: - the naturally-caused movement of the earth's crust has caused damage in the surroundings of the insured location to buildings having been in good order and condition or to other property that is at least as resistant, or that - the damage can only have been caused by an earthquake because of the insured objects having been in good order and condition.
Compensation limits	There are no standard deductibles.
Bundling	They depend on the type of insurance contract.
Pricing	Risk-based. Premiums are estimated on the basis of quantitative data coming from GFZ Potsdam <sup>38</sup> (a German geographical research centre).
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Germany has provided, in some cases, ex-post compensation to victims of specific disaster events. Now it does not pay any subsidies any more but it gives loans to victims at low interest rates. Loans are intended to ridge time until claim settlements by the insurances are done. <sup>39</sup>
Financing - Description	

Sources: CCS (2008); GDV (2010); OECD (2008)

<sup>38</sup> See <http://www.gfz-potsdam.de/portal/gfz/home>

<sup>39</sup> See: <http://www.mdr.de/sachsen-anhalt/unwetter264.html>, <http://www.sachsen-anhalt.de/index.php?id=51474> and [http://amt24.sachsen.de/ZFinder/verfahren.do.jsessionid=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2\\_2?action=showdetail&islandesimpressum=false&modul=VB&id=42961510](http://amt24.sachsen.de/ZFinder/verfahren.do.jsessionid=07DF78D7554C3E3AFB6FF712F4A7C17F.zufi2_2?action=showdetail&islandesimpressum=false&modul=VB&id=42961510)

## Ireland - Flood, Storm, Earthquake

Type of information	Action
Definition	Storm, flood, earthquake.
Compensation limits	
Bundling	Standard household insurance policies in Ireland cover damage caused by floods, storms and earthquakes.
Pricing	Risk-based
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The State does not back the insurers.
Financing - Description	
Other	There exists no NatCat scheme in place. NatCat coverage is optional but most mortgage lenders require borrowers to have buildings insurance.

Source: CEA (2011(a)); CEA (2011(b))

## Greece - Flood

Type of information	Action
Definition	
Compensation limits	There is a deductible equal to $\min\{10\% \text{ loss}; \text{€ } 500\}$ .
Bundling	Fire insurance policies are usually extended to include NatCat coverage.
Pricing	Rates are unrestricted without area distinction depending on the construction of the building and the type of risk.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	There is a project of introducing a compulsory insurance against NatCat.

Sources: CEA (2005); CEA (2011(a))

## Greece - Storm

Type of information	Action
Definition	
Compensation limits	There is a deductible equal to $\min\{10\% \text{ loss}; \text{€ } 500\}$ .
Bundling	Fire insurance policies are usually extended to include NatCat coverage.
Pricing	Rates are unrestricted without area distinction depending on the construction of the building and the type of risk.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	There is a project of introducing a compulsory insurance against NatCat.

Source: CEA (2005)



## Greece - Earthquake

Type of information	Action
Definition	
Compensation limits	There is a deductible equal to 2% of the insured amount.
Bundling	Fire insurance policies are usually extended to include NatCat coverage.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	There is a project of introducing a compulsory insurance against NatCat.

Source: CEA (2005)

## Spain - Flood, Storm, Earthquake

Type of information	Action
Definition	Floods (inundation of the terrain caused by rainfall or melt water, by water from lakes with a natural outlet, from estuaries or rivers, or from natural watercourses on the surface whenever they overflow their normal channel, dashing of sea on land) earthquakes, tsunamis, volcanic eruptions, cyclonic storms (tornadoes and extraordinary winds, with gusts of over 120km/h) and fall of sidereal bodies and meteorites.
Compensation limits	In the case of direct damages, a deductible of 7% of the amount of compensable damage is applied (except for cars, dwellings and condominiums). No deductible is applied for personal insurance lines (life and accidents). For business interruption cover, the deductible is the same provided by the base policy.
Bundling	The NatCat coverage is compulsory linked with a base policy (personal accident policies, life policies and property damage policies). If the cover is not explicitly assumed by the insurance company issuing the standard policy, the CCS must necessarily provide such a cover on a subsidiary basis.
Pricing	The rate for covering the extraordinary risks is a rate applied to the insured capital. Rates: - Houses: 0.008% - Offices: 0.012% - Business: 0.018% - Industrial risk: 0.021% - Private cars: € 3.5 - Civil works: 0.028%-0.163% - Life and accident insurance: 0.0005% - Business interruption: 0.0005% for dwellings and 0.024% for the other risks.
Provisioning Practices	CCS must set up an equalization reserve, according to the law. It is a cumulative provision (endowed with the annual profits), fiscally deductible up to a certain legally established limit (in terms of amounts and time periods).
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The CCS is backed by the Government guarantee in order to meet any indemnity obligations that overrun its final capacity. However, the reserves set aside have enabled the CCS to meet the losses without having had to make use of the State guarantee.
Financing - Description	The CCS is a public business entity. Its main aim is to indemnify claims made as a result of extraordinary events, whenever any of the following conditions are met: - the extraordinary risk is not specifically and explicitly covered by another insurance policy; - the extraordinary risk is covered by another insurance policy but the company that issued this policy cannot face its obligations.

Sources: CCS (2008); OECD (2003(a)); OECD (2008)

## France - Flood, Earthquake, Drought

Type of information	Action
Definition	<p>Any natural event of "abnormal intensity" (according to the legal text). floods and/or mudslides, hurricanes, earthquakes, landslides, geotechnical subsidence, differential landslides following drought and dehydration of the soils, tidal waves, flows of water, mud or lava, moving masses of ice or snow.</p> <p>Triggering events for the compensation: an insurance policy has been taken up for damage to the affected property and the State has declared a NatCat.</p>
Compensation limits	<p>There is no compensation limit but there are deductibles. Coverage included direct material damages and business interruption, if included in the base contract.</p> <p>Deductibles (compulsory and not redeemable):  property for domestic use and other objects not intended for professional use: € 380, except in the case of damage drought and/or subsidence, where the deductible is € 1 520.  Motor vehicles: € 380  property for professional use: min{10%; € 1 140}, if the damage is attributable to subsidence, the deductible is € 3 050.  business interruption: 3 working days subject to a minimum of € 1 140.</p> <p>There is also a sliding scale ("risk-based" principle). Deductibles are increased when the loss occurs in municipalities without a Foreseeable Natural Risk Prevention Plan. If, during the previous 5 years, there has been <math>n</math> NatCat declarations, the deductibles are multiplied by a factor equal to <math>(n-7)</math>.</p>
Bundling	Coverage for NatCat is mandatory included in all policies against fire and all the other properties damages (including car policies). Insured pays an additional amount, fixed by the State (Bureau Central de Tarification, CTO).
Pricing	<p>Flat rates fixed by the State (Bureau Central de Tarification, CTO).</p> <p>Property damage and business interruption: 12%</p> <p>Motor vehicles: 6% of fire and theft premiums or contributions.</p>
Provisioning Practices	In order to meet potential substantial payments NatCat may represent, insurance and reinsurance companies are allowed to create the equalization reserves. They are allowed to place up to 75% of the profits for each year into this reserve on a tax free basis provided that the total amount of the reserve does not exceed 300% of their annual income. The funds for each year are released after ten years.
Insurability Problems? Adverse Selection	The presence of flat rates could limit or reduce prevention measures potentially taken by individuals.
Public Intervention - Non financial - Financial	<p>The system acts as a compensation tool. The state is in charge of setting additional premiums, establishing deductibles and declaring the state of natural catastrophe. Moreover, the state owns and backs the Casse Centrale de Réassurance (CCR).</p> <p>CCR  Insurers can reduce their risks by reinsuring. The biggest reinsurance company is the CCR, which is the only one which provides for unlimited guarantee, thanks to the Government guarantee.</p> <p>There are two reinsurance solutions.</p> <p><u>Quota-share</u>: the Insurer cedes a certain proportion of the premiums collected to the reinsurer and the latter, in return, undertakes to pay the same proportion of losses. This proportion is called the "cession". Conversely, the part of the premium which is kept by the Insurer is called the "retention". Quota-share reinsurance ensures that the reinsurer truly follows the fortunes of the insurer, since the latter has to cede a percentage of each of the accounts in its portfolio to the reinsurer. Thus the risk of anti-selection is avoided.</p> <p><u>Stop-loss</u>: it covers the portion not ceded on a quota-share basis by the Insurer, in other words the Insurer's "retention". This is a so called "non-proportional" form of reinsurance because, contrary to the "quota-share" system, the reinsurer only intervenes if the total annual losses exceed an agreed figure, expressed as a percentage of the premiums retained. In particular, this type of reinsurance enables the insurer to protect itself against the frequency risk, i.e. the risk of many claims occurring at the same time.</p> <p>Although most "quota-share" and "stop-loss" reinsurance treaties contain a limit of indemnity, CCR's cover in the field of natural catastrophes is unlimited thanks to the State guarantee from which it benefits.</p>

Type of information	Action
Financing - Description	Events triggering the reimbursement: - the claimant has contracted insurance; - the Government declares a natural catastrophe in an interministerial decree. Private insurers collect and manage the additional premiums, process claims and pay the related indemnifications. In the case of loss the insured must file the related claim with his insurer within 10 days (30 days in case of business interruption) from the time of declaration of the NatCat in the interministerial decree. The insurer will indemnify the insured within 3 months.

Sources: Botzen and Bergh (2008); CCR (2010); CCS (2008); CEA (2009); OECD (2003(a)); OECD (2008)

## France - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	Storm coverage is compulsory bundled with hailstorm and weight of storm on roofs coverages.
Pricing	Driven by the market
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	
Other	Storm coverage is not part of the NatCat regime.

## Italy - Flood, Storm, Earthquake

Type of information	Action
Definition	
Compensation limits	
Bundling	Coverage against NatCat can be an extension of fire policies. The extension is quite common in commercial policies, but there are few thousands fire policies dedicated to households having the extension to NatCat.
Pricing	
Provisioning Practices	Insurance companies are obliged to set aside reserves for NatCat. Such reserves are tax-deductibles.
Insurability Problems? Adverse Selection	Ex-post interventions lead to underestimation of the risks potentially faced. Adverse selection: high risk concentrated in small area -> difficult to estimate the amount of capital to set aside; difficult to create a market for these specific policies.
Public Intervention - Non financial - Financial	There is no ex-ante measure. In case of losses due to NatCat, the State intervenes by providing ex-post financial aid and enacting ad-hoc laws.
Financing - Description	
Other	At present in Italy there is no compulsory insurance against catastrophic risks. Several proposals have been made during the past years, but none has made it through the legislative process yet, partly due to competition law restrictions and to the opposition of consumer associations.

Sources: ANIA (2011); CEA (2011(a)); OECD (2008)

## Luxembourg - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	Flood insurance is an optional extension of base policies.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Flood insurance is marketed on a voluntary basis.

Source: OECD (2008); CEA (2011 (b))

## Luxembourg - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	Storm insurance is almost systematically included in multi-peril property insurance policies.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Storm insurance is marketed on a voluntary basis.

Source: OECD (2008)



## Hungary - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The Fund for Flood and Inland Water Compensation is backed by Government if it lacks enough resources to fulfill its obligations.
Financing - Description	There exists a Fund for Flood and Inland Water Compensation. Individuals who own real property in risky regions pay contributions to the Fund and, based on these contributions, are entitled to indemnification in the case of loss.

Source: OECD (2008)

## Hungary - Storm

Type of information	Action
Definition	Wind speed of at least 54 km/h.
Compensation limits	Insurers reimburse up to the rebuilding value of the insured property. Deductibles depend on the policy type and, if there is any, they are on average € 200.
Bundling	Storm insurance is part of every home insurance policy.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	In case of losses not covered by insurance, the Government ad-hoc compensations has been available by the State.
Financing - Description	

Source: Bilateral exchange of information with representatives of MABISZ (Association of Hungarian Insurance Companies)

## The Netherlands - Flood

Type of information	Action
Definition	All flood events but heavy rainfall.
Compensation limits	
Bundling	
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Flood risk is not insurable and citizens receive compensations from the Government on an ad hoc basis (Calamities Compensation act). The maximum annual aid the State is willing to pay is € 450 000 000.
Financing - Description	

Sources: Botzen and Bergh (2008); CCS (2008); OECD (2008)

## The Netherlands - Storm

Type of information	Action
Definition	Wind speed of more than 50.4 km/h.
Compensation limits	There is a deductible equal to 2% of the insured capital.
Bundling	Extension of property damage policies.
Pricing	0.15% of the insured capital.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The State could provide ad hoc compensation depending on the case.
Financing - Description	Insurance against storm is optional.

Sources: CCS (2008); OECD (2008)

## The Netherlands - Earthquake

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	Earthquake risk is not insurable and citizens receive compensations from the Government on an ad hoc basis (Calamities Compensation act). The maximum annual aid the State is willing to pay is € 450 000 000.
Financing - Description	

Sources: CCS (2008); OECD (2008)

## Austria - Flood

Type of information	Action
Definition	
Compensation limits	Maximum indemnification applied to buildings is a percentage (up to 50%) of the capital insured, or a fixed amount, generally ranging from € 3,700 to € 10,000. Indemnification limits for contents are similar to those for buildings.
Bundling	The flood coverage is optional. Insurers usually offer this cover in exchange for an additional premium to household policies, rather than in combination with other risks.
Pricing	Premiums are not dependent on risk. The use of risk zoning for pricing purpose is under consideration.
Provisioning Practices	
Insurability Problems? Adverse Selection	With a demand for cover in areas repeatedly affected by flooding, such cover is, if available, very expensive.
Public Intervention - Non financial - Financial	<p>In principle the responsibility for coping with the damage caused by NatCat is attributed to the Länder, but in 1966 the Disaster Fund was settled. The main aims of the Fund are:</p> <ul style="list-style-type: none"> <li>- finance preventive measures against avalanches and floods</li> <li>- support the Länder in covering incurred losses.</li> </ul> <p>Fund's interventions</p> <p>Private properties. Private households and companies are usually granted 20-30% indemnity for the incurred loss by the Länder. The Disaster Fund then reimburses 60% of the financial aids spent by the Länder.</p> <p>Public properties. The Fund compensates 50% of the damage to Länder and municipal property.</p> <p>In case of extreme situations, the Austrian Parliament could grant additional resources..</p>
Financing - Description	The fund is financed by a certain percentage (according to the Austrian Disaster Fund 2006-2007 equal to 1.1%) of the revenue of the following taxes: income tax, wage tax, tax on capital yields and corporation tax, deducted from the federal share in those taxes. Financial means which are not spent in a respective year are subject to a reserve. This reserve is limited to € 29 million, but in case of extreme disaster the Federal Government provides additional funds.
Other	Austrian Government has started the program "Flood risk zoning in Austria – HORA", whose main aim is to build an Austria-wide risk zoning system for natural catastrophes which focuses on floods.

Sources: BMF (2006-2007); CCS (2008); OECD (2003(b)); OECD (2008); VVO web page

## Austria - Storm

Type of information	Action
Definition	Wind speed greater than 60km/h.
Compensation limits	
Bundling	Standard households' policies include storm protection; commercial and industrial risk policies protect against storm by means of an optional extension of cover.
Pricing	Premiums are not dependent on risk. The use of risk zoning for pricing purpose is under consideration.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	<p>In principle the responsibility for coping with the damage caused by NatCat is attributed to the Länder, but in 1966 the Disaster Fund was settled.</p> <p>Fund's interventions Private properties. Private households and companies are usually granted 20-30% indemnity for the incurred loss by the Länder. The Disaster Fund then reimburses 60% of the financial aids spent by the Länder.</p> <p>Public properties. The Fund compensates 50% of the damage to Länder and municipal property.</p> <p>In case of extreme situations, the Austrian Parliament could grant additional resources.</p>
Financing - Description	The fund is financed by a certain percentage (according to the Austrian Disaster Fund 2006-2007 equal to 1.1%) of the revenue of the following taxes: income tax, wage tax, tax on capital yields and corporation tax, deducted from the federal share in those taxes. Financial means which are not spent in a respective year are subject to a reserve. This reserve is limited to € 29 million, but in case of extreme natural catastrophes the Federal Government provides additional funds.

Sources: BMF (2006-2007); CCS (2008); OECD (2008); VVO web page

## Austria - Earthquake

Type of information	Action
Definition	
Compensation limits	The indemnification limit is around € 7.500 for households and somewhat higher for commercial and industrial risk policies.
Bundling	
Pricing	Premiums are not dependent on risk. The use of risk zoning for pricing purpose is under consideration.
Provisioning Practices	Austrian legal provisions do not allow insurance companies to establish tax-exempt equalization reserves.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	<p>In principle the responsibility for coping with the damage caused by NatCat is attributed to the Länder, but in 1966 the Disaster Fund was settled.</p> <p>Fund's interventions Private properties. Private households and companies are usually granted 20-30% indemnity for the incurred loss by the Länder. The Disaster Fund then reimburses 60% of the financial aids spent by the Länder.</p> <p>Public properties. The Fund compensates 50% of the damage to Länder and municipal property.</p> <p>In case of extreme situations, the Austrian Parliament could grant additional resources.</p>
Financing - Description	The fund is financed by a certain percentage (according to the Austrian Disaster Fund 2006-2007 equal to 1.1%) of the revenue of the following taxes: income tax, wage tax, tax on capital yields and corporation tax, deducted from the federal share in those taxes. Financial means which are not spent in a respective year are subject to a reserve. This reserve is limited to € 29 million, but in case of extreme natural catastrophes the Federal Government provides additional funds.

Sources: BMF (2006-2007); CCS (2008); OECD (2008)



## Poland - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	Agricultural sector: compulsory insurance against flood. Other sectors: NatCat insurance marketed on a voluntary basis.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	Main drawbacks: the very low risk awareness among population, the lack of a system of compulsory insurance against natural catastrophes, the lack of a comprehensive emergency management legislation, and the inadequacy of the financial means allocated to disaster mitigation and prevention in relation to existing needs.
Public Intervention - Non financial - Financial	There is a law to reduce the effects of natural catastrophes and to provide assistance to insured parties. It comprises: - ad hoc compensations - permanent acts providing for a more structured mechanism of state funding for the compensation to victims. This system includes various different measures, including: assistance provided to support the affected population and small and medium-sized businesses; reconstruction of infrastructure; construction of new infrastructures; modernization of flood protection systems. There is the National Programme for Restoration and Modernization, which covers damages caused by flood to individual, commercial and local community property. This is a governmental compensation scheme.
Financing - Description	The most important sources of financing are the state budget, the budgets of regional self-Government units, the national assistance funds and non-budget means obtained through public fund raising.
Other	The insurance industry has drawn up an assessment system for flood threat and risk accumulation, which will offer insurers a view of flood risk in their insurance portfolio. This system may lead to a diversification of premium rates. In terms of risk modeling, insurers create models to estimate the damages caused by the natural forces for purposes of reinsurance and to protect their own insurance portfolios.

Sources: CEA (2005); OECD (2003(b)); OECD (2008)

## Poland - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	Agricultural sector: compulsory insurance against flood. Other sectors: NatCat insurance marketed on a voluntary basis.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	Main drawbacks: the very low risk awareness among population, the lack of a system of compulsory insurance against natural catastrophes, the lack of a comprehensive emergency management legislation, and the inadequacy of the financial means allocated to disaster mitigation and prevention in relation to existing needs.
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Financing - Description	The most important sources of financing are the state budget, the budgets of regional self-Government units, the national assistance funds and non-budget means obtained through public fund raising.

Sources: CEA (2005); OECD (2003(b)); OECD (2008)

## Poland - Earthquake

Type of information	Action
Definition	
Compensation limits	
Bundling	NatCat insurance is marketed on a voluntary basis.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	Main drawbacks: the very low risk awareness among population, the lack of a system of compulsory insurance against natural catastrophes, the lack of a comprehensive emergency management legislation, and the inadequacy of the financial means allocated to disaster mitigation and prevention in relation to existing needs.
Public Intervention - Non financial - Financial	There is a law to reduce the effects of natural catastrophes and to provide assistance to insured parties. It comprises: - ad hoc compensations - permanent acts providing for a more structured mechanism of state funding for the compensation to victims. This system includes various different measures, including: assistance provided to support the affected population and small and medium-sized businesses; reconstruction of infrastructure; construction of new infrastructures.
Financing - Description	The most important sources of financing are the state budget, the budgets of regional self-Government units, the national assistance funds and non-budget means obtained through public fund raising.

Sources: CEA (2005); OECD (2003(b)); OECD (2008)

## Portugal - Flood

Type of information	Action
Definition	
Compensation limits	There are deductibles equal to 10% of damage.
Bundling	Flood coverage is part of the basic cover "Fire and Natural events" private insurance policies.
Pricing	
Provisioning Practices	The Portuguese legislation requires insurers to constitute an equalization reserve; this reserve is tax-exempt.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Sources: CEA (2005); CEA (2011(a)); OECD (2008)

## Portugal - Storm

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Definition	
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Bundling	Storm coverage is part of the basic cover "Fire and Natural events" private insurance policies.
Pricing	
Provisioning Practices	The Portuguese legislation requires insurers to constitute an equalization reserve; this reserve is tax-exempt.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	.

Sources: CEA (2005); CEA (2011(a)); OECD (2008)

## Portugal - Earthquake

Type of information	Action
Definition	
Compensation limits	Deductibles are applied throughout the market, but there is no uniform tariff.
Bundling	Coverage against earthquake is offered as an extension of fire policy.
Pricing	Different risk areas are taken into account.
Provisioning Practices	The Portuguese legislation requires insurers to constitute an equalization reserve which is tax-exempt. The provision should be made in the form of an annual allocation until the accumulated amount of the provision reaches no more than the equivalent of 75% of the insurer's own capital.
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	As the Portuguese insurance market does not absorb catastrophic risk alone, reinsurance arrangements are made with large international reinsurance companies
Other	Earthquake coverage is not mandatory but most banks provide with mortgages only in the case of full coverage insurance, including earthquake risks.

Sources: CEA (2005); OECD (2008)

## Romania - Flood

Type of information	Action
Definition	
Compensation limits	Type A: € 20 000 Type B: € 10 000 There are proposals for introducing 5% and 7% deductibles, but the Government does not agree to introduce such deductibles.
Bundling	No
Pricing	There exists two classes of dwellings: type A (reinforced concrete frames, metal or with outside walls made of burnt brick or wood) and type B (outside walls made of unburnt bricks or other forms of adobe) Type A: € 20 Type B: € 10.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The Government will fund reinsurance premiums in early years and act as lender of last resort in the event of overwhelming losses.
Financing - Description	Insurers issue policies, assess and settle claims. They are reinsured with the Natural Disaster Insurance Pool (PAID), which is to be a joint stock owned by qualifying insurers.
Other	There exists a compulsory insurance scheme, PRAC Only public and private dwellings are covered. Insurance is compulsory for every dwelling (public and private).

Sources: CCS (2008); Guy Carpenter (2005); Badea (2009)

## Romania - Earthquake

Type of information	Action
Definition	
Compensation limits	Type A: € 20 000 Type B: € 10 000 There are proposals for introducing 5% and 7% deductibles, but the Government does not agree to introduce such deductibles.
Bundling	Insurance is compulsory for every dwelling (public and private).
Pricing	There exists two classes of dwellings: type A (reinforced concrete frames, metal or with outside walls made of burnt brick or wood) and type B (outside walls made of unburnt bricks or other forms of adobe) Type A: € 20 Type B: € 10.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The Government will fund reinsurance premiums in early years and act as lender of last resort in the event of overwhelming losses.
Financing - Description	Insurers issue policies, assess and settle claims. They are reinsured with the Natural Disaster Insurance Pool (PAID), which is to be a joint stock owned by qualifying insurers.
Other	There exists a compulsory insurance scheme, PRAC Only public and private dwellings are covered.

Sources: CCS (2008); Guy Carpenter (2005); Badea (2009)



## Slovenia - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	Flood coverage is generally included in most household contents policies.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Source: Guy Carpenter (2007)

## Slovenia - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	Storm coverage is sold only as part of the additional coverage for package for building insurance.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Source: Guy Carpenter (2007)

## Slovenia - Earthquake

Type of information	Action
Definition	
Compensation limits	
Bundling	Earthquake coverage is sold only as part of the additional coverage package for building insurance.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Source: Guy Carpenter (2007)

## Slovakia - Flood

Type of information	Action
Definition	
Compensation limits	Some insurers apply limits.
Bundling	Flood coverage is generally included in most household policies and it is optional for commercial and industrial buyers
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	In the past the Government was called upon to provide ex-post compensation in case of extreme hardship for victims.
Financing - Description	
Other	There is no compulsory flood insurance system.

Sources: Guy Carpenter (2007); OECD (2008)

## Slovakia - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	In the past the Government was called upon to provide ex-post compensation in case of extreme hardship for victims.
Financing - Description	
Other	There is no compulsory flood insurance system.

Source: OECD (2008)

## Finland - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	The State reimbursed damages related to exceptional floods. However, a bill has been recently accepted to abolish the state flood cover.
Financing - Description	There is no compulsory natural catastrophes insurance.

Sources: CEA (2011(a)); OECD (2008)

## Finland - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	Storm insurance is included in most of household insurance policies.
Pricing	
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	

Source: OECD (2008)

## Sweden - Flood

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	The place where the property is situated does not influence the premium to be paid.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Optional coverage
Other	More or less all property owners have an insurance contract on their house due to the fact that the banks request it for mortgages. All house and household insurances on the Swedish market have cover for flooding, storm, landslide, volcanoes, earthquake etc.

Source: CEA (2005); CEA (2011(a))



## Sweden - Storm

Type of information	Action
Definition	
Compensation limits	
Bundling	
Pricing	The place where the property is situated does not influence the premium to be paid.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Optional coverage
Other	More or less all property owners have an insurance contract on their house due to the fact that the banks request it for mortgages. All house and household insurances on the Swedish market have cover for flooding, storm, landslide, volcanoes, earthquake etc.

Source: CEA (2005); CEA (2011(a))

## Sweden - Earthquake

Type of information	Action
Definition	
Compensation limits	Coverage for earthquake is limited to SEK 5 million (around € 525,000 as of 2010).
Bundling	
Pricing	The place where the property is situated does not influence the premium to be paid.
Provisioning Practices	
Insurability Problems? Adverse Selection	
Public Intervention - Non financial - Financial	
Financing - Description	Optional coverage
Other	More or less all property owners have an insurance contract on their house due to the fact that the banks request it for mortgages. All house and household insurances on the Swedish market have cover for flooding, storm, landslide, volcanoes, earthquake etc.

Source: CEA (2005); CEA (2011(a))

## United Kingdom - Flood

Type of information	Action
Definition	
Maximum Potential Loss	
Penetration rate of insurance covering the risk	
Compensation limits	Deductibles can be applied, depending on the policy.
Bundling	Coverage against flood is included in building or home contents insurance.
Pricing	Risk-based (based on geographical risk characteristics). They are moving beyond flood risk zoning, towards individual risk rating, where the flood risk is calculated at the level of individual buildings.
Provisioning Practices	Insurance companies are allowed to accumulate tax-exempted reserves.
Insurability Problems? Adverse Selection	The absence of public reinsurance makes insurance premiums relatively expensive.
Public Intervention - Non financial - Financial	The Government does not provide compensation in case flood damage occurs; only private companies do it.
Financing - Description	Private insurance companies cover flood risks for households and companies.
Other	Flood coverage is not mandatory but mortgages are provided only in the case of full coverage insurance, including flood risks. According to the Statement of Principles on the Provision of Flood Insurance (2005), insurers offer flood insurance renewals to homes and small businesses where the flood risk is less than 1.3% (1 in 75 year event), or where the risk is greater than 1.3% but where the Environment Agency has announced plans to reduce the risk below that level within five years. This is in exchange for a number of Government commitments on managing flood risk. The Statement of Principles will expire in mid-2013 and it will not be renewed. Situation in UK is rather heterogeneous, as highlighted by Crichton (2011). Flood risk in Scotland is lower than in England and Scotland adopted different solutions to face flood risks with respect to England.

Sources: ABI (2011); Botzen and Bergh (2008); CCS (2008); Crichton (2011); Dlugolecki, et al. (2009); OECD (2008); Oxera (2011)

## United Kingdom - Storm

Type of information	Action
Definition	
Compensation limits	Deductibles can be applied, depending on the policy.
Bundling	Coverage is included in building or home contents insurance.
Pricing	Risk-based
Provisioning Practices	Insurance companies are allowed to accumulate tax-exempted reserves.
Insurability Problems? Adverse Selection	The absence of public reinsurance makes insurance premiums relatively expensive.
Public Intervention - Non financial - Financial	The Government does not provide compensation in case damages occurs.
Financing - Description	Private insurance companies cover NatCat risks for households and companies.
Other	NatCat coverage is not mandatory but mortgages are provided only in the case of full coverage insurance.

Sources: Botzen and Bergh (2008); CCS (2008); OECD (2008)

## United Kingdom - Earthquake

Type of information	Action
Definition	
Compensation limits	Deductibles can be applied, depending on the policy.
Bundling	Coverage is included in building or home contents insurance.
Pricing	
Provisioning Practices	Insurance companies are allowed to accumulate tax-exempted reserves.
Insurability Problems? Adverse Selection	The absence of public reinsurance makes insurance premiums relatively expensive.
Public Intervention - Non financial - Financial	The Government does not provide compensation in case damages occurs.
Financing - Description	Private insurance companies cover NatCat risks for households and companies.
Other	NatCat coverage is not mandatory but mortgages are provided only in the case of full coverage insurance.

Sources: Botzen and Bergh (2008); CCS (2008); OECD (2008)

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**Abstract**

The present report presents a scientific exercise aimed at drawing a picture of the relevance of various natural catastrophes in the EU Member States and of the development of the Natural Catastrophes insurance markets. The exercise focuses on flood, storm, earthquake and drought and for each disaster JRC collected available qualitative and quantitative information in order to describe the size of the risk and to describe existing practices of insurance systems. The collected information has the purpose to create clusters of Member States facing similar situations and to identify open issues concerning insurance systems in place.

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