

# Projection of property damage due to hydrometeorological causes (flood and wind) and estimate of the extraordinary risk insurance scheme capacity in the context of climate change

Based on the compensation paid by Consorcio de Compensación de Seguros with regard to property damage caused by hydrometeorological causes (strong winds and flood) and on the sums at risk, a projection has been made for the next 30 years using certain assumptions so as to arrive to an approximation of the capacity of the extraordinary risk insurance scheme to cater for with the expected increase in hazardousness owing to climate change.

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The purpose of this study is to arrive at a projection of future developments over the next 30 years (2017-2046) for exposure, surcharges collected by *Consorcio de Compensación de Seguros* (CCS) and property loss experience for extraordinary risk insurance caused by hydrometeorological phenomena (flood and strong winds), considering the trends throughout the past 30 years (1987-2016) as a basis. The ultimate aim is to estimate the capacity of the extraordinary risk insurance scheme (according to its current definition) to deal with future losses or to find out what margins for expected property loss would make a rethink of current parameters become necessary.

In this paper all financial amounts are expressed in millions of euros updated as of 31 December 2016.

## 1. Baseline

### 1.1. The initial baseline data comprises:

- **Sums at risk**, information coming from the statistical records that insurers send on an annual basis to CCS and which feature the data on policies issued or renewed over the financial year for risks covered by CCS.
- **Surcharges revenue**, which refers to the yearly surcharges according to the annual reports of CCS, without deducting the collecting commission retained by the insurers (5 %) by way of management expenses. These surcharges refer to all the causes covered by the extraordinary risk insurance: hydrometeorological, other natural causes and man-made causes.



Within the orbit of hydrometeorological risks, data show the existence of a mitigating effect for vulnerability. This vulnerability reduction can be attributed to a series of factors, such as better early warning systems, better hydrological and emergency management, land planning and risk awareness measures, as well as to the adoption of self-protection measures by the policyholders.

- **Compensation:** amounts paid out and provisioned for in connection with loss reported and occurring in the series analysed, less deductibles and application of the proportional rule where appropriate. The sums are distributed according to the causes that are being examined in this paper (flood and wind).

## 1.2. The following hypotheses are applied to the initial data:

- Given that, owing to the legal timing for presenting statistical records, the information on sums at risk in 2016 is not available at the time of writing of this article, it has been necessary to include an estimate for that year. A new aspect is that this estimate adds in a valuation of the portfolio of vehicles covered.
- For the sake of completion in gauging loss experience in 1987-2003 from wind damage according to the current definition of an atypical cyclonic storm (TCA, in Spanish)<sup>1</sup>, the percentage of wind loss compared to flood loss has been calculated for the 2004-2016 dataset, resulting in a figure of 43%. This percentage has been applied to the 1987-2003 series.

According to the initial data and the hypotheses established regarding it, a summary of the baseline situation is given in table 1, showing the sums at risk, loss incurred due to hydrometeorological causes, frequency (expressed as the ratio of compensation owing to these causes to sums at risk, per mille) and loss ratio (the ratio of compensation paid vs. surcharge income for all perils covered, expressed as a percentage).

Amounts in M.€ as of 31 Dec 2016

(continued on the next page)

YEARS	SUMS AT RISK	LOSS: FLOOD AND WIND	FREQUENCY (‰): FLOOD AND WIND	LOSS RATIO (%)
1987	1,286,820	489	0.38	321%
1988	1,351,161	148	0.11	93%
1989	1,418,719	413	0.29	182%
1990	1,489,655	44	0.03	18%
1991	1,587,883	69	0.04	26%
1992	1,742,521	101	0.06	36%
1993	1,843,044	58	0.03	19%
1994	1,946,266	163	0.08	53%
1995	1,961,764	164	0.08	51%
1996	2,076,836	210	0.10	62%
1997	2,285,820	432	0.19	117%
1998	2,565,171	80	0.03	20%
1999	2,655,789	171	0.06	41%
2000	2,674,980	274	0.10	61%

Table 1. Baseline situation. Data as of 28 Feb 17.

(1) Article 2 of the Regulation of the Extraordinary Risk Insurance, approved by Royal Decree 300/204 of 20 February, and successive amendments.

Amounts in M.€ as of 31 Dec 2016

YEARS	SUMS AT RISK	LOSS: FLOOD AND WIND	FREQUENCY (‰): FLOOD AND WIND	LOSS RATIO (%)
2001	2,933,079	205	0.07	43%
2002	3,059,057	213	0.07	45%
2003	3,383,884	143	0.04	27%
2004	3,642,977	137	0.04	25%
2005	3,832,693	189	0.05	32%
2006	4,221,980	189	0.04	30%
2007	4,417,284	310	0.07	47%
2008	4,583,416	280	0.06	40%
2009	4,865,635	759	0.16	115%
2010	5,014,652	462	0.09	73%
2011	5,105,029	182	0.04	29%
2012	5,116,512	274	0.05	43%
2013	4,996,948	179	0.04	28%
2014	5,127,210	163	0.03	25%
2015	5,271,947	181	0.03	27%
2016	5,346,848	190	0.04	28%
<b>TOTAL</b>	<b>97,805,578</b>	<b>6,872</b>	<b>0.07</b>	<b>49%</b>
	<b>Yearly mean loss:</b>	<b>229</b>		

Table 1. Baseline situation. Data as of 28 Feb 17.

## 2. Parameter projection for the next 30 years

Based on this information, a projection has been made of how these risks will perform over the next 30 years in terms of sum at risk, surcharges income, compensation, loss frequency and loss ratio, while using the following **hypotheses regarding such a projection**:

- **The sum at risk** is projected from 2016, the last year in the dataset, by applying the average annual increase that has occurred over the last 10 years (2 %). This projection takes in both the increase in the number of policies (level of insurance penetration and new risks assumed) and the increase in sums for existing policies.

It's not a determining hypothesis as the rise in exposed value does not have a direct impact on CCS extraordinary risks insurance cover scheme: there is a direct relationship between exposure and income which CCS itself decides. In other words, surcharges collected by CCS are directly in proportion to the amount and value of risk exposure.

- **Surcharges** are estimated by applying the average rate for 2016 (0.126 %) to projected sums at risk. This projection equates to assuming that the distribution by risk classes and rates remains at 2016 levels.
- The **compensation** for the next 30 years is projected by applying the annual frequency for the past 30 years to the exposure for each year, corrected by a percentage adjustment for vulnerability due to the following reason:

Within the orbit of hydrometeorological risks, data show the existence of a mitigating effect for vulnerability. As shown in Figure 1, there is no direct relationship between the increase in sums at risk -direct consequence of the rise of both insurance penetration and value insured in Spain- and the increase in loss.

Figure 2, reflecting the mean costs -in 2016 euros- of hydrometeorological-caused claims, shows that the mean cost has reduced by two-thirds during the last 30 years. This downward trend in loss, being that the threat (frequency and intensity of flood and winds) does not seem to have varied much and that the sum at risk has been multiplied by five (Figure 1), can only be explained by a reduction in vulnerability. This vulnerability reduction can be attributed to a series of factors, such as better early warning systems, better hydrological and emergency management, land planning and risk awareness measures, as well as to the adoption of self-protection measures by the policyholders.

### COMPARATIVE TREND FOR SUMS AT RISK AND LOSS EXPERIENCE

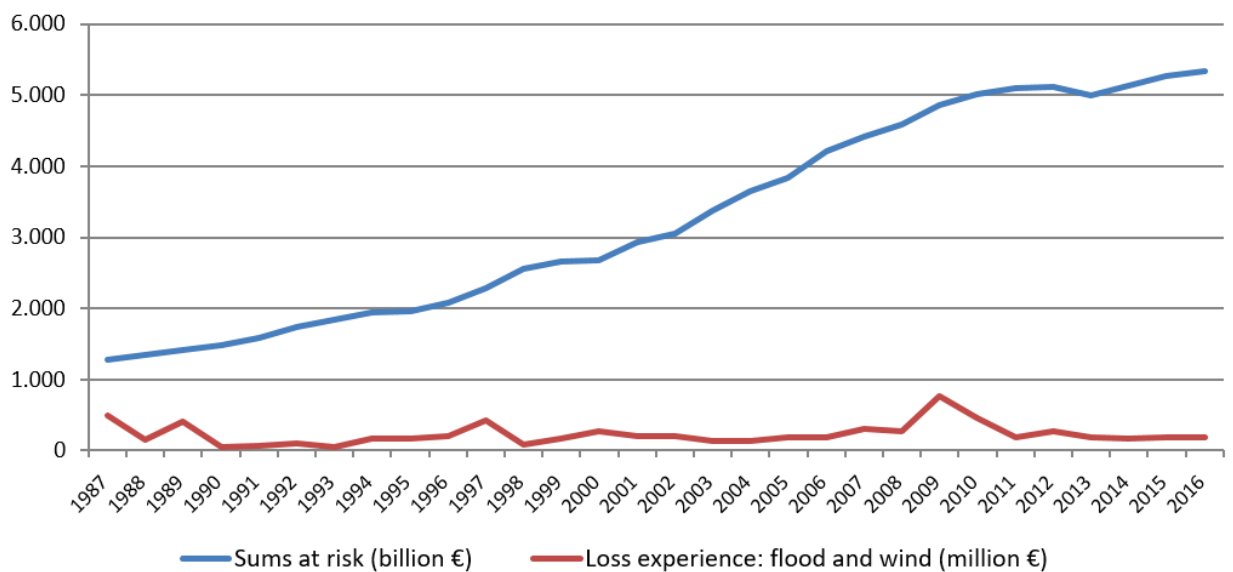


Figura 1.

### MEAN COST per flood/wind CLAIM in euros

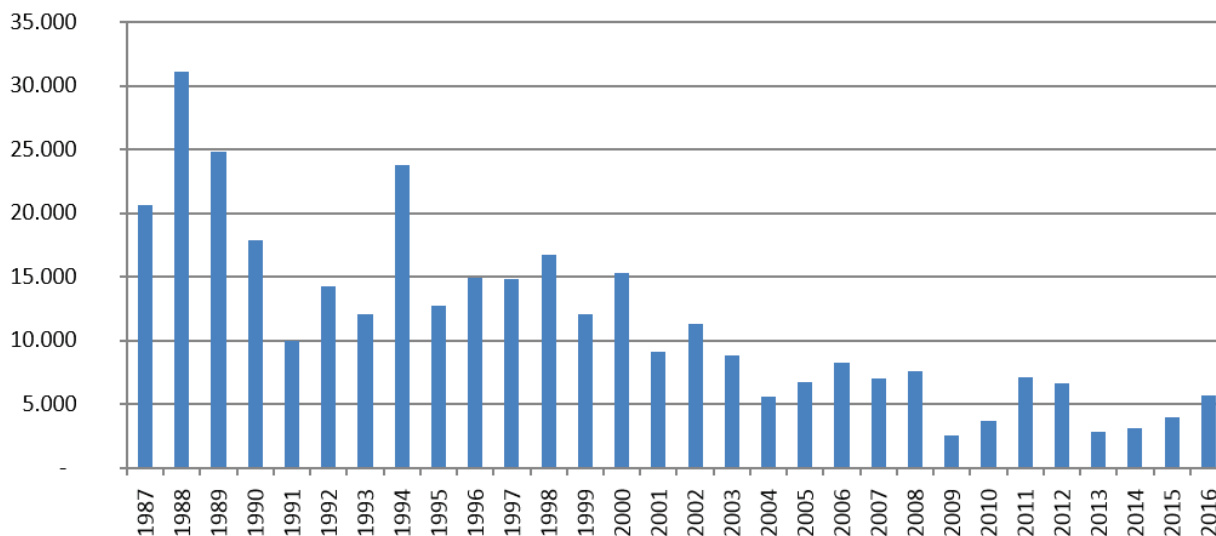


Figura 2.

Regarding the projection of the future losses several scenarios can be considered for the evolution of vulnerability along the period 2017-2046. A first scenario contemplates no variation in vulnerability with respect to the last three decades (1987-2016); a second scenario estimates that this downward trend is going to continue slightly and, therefore, a vulnerability percentage of 90% is applied to future loss and, a third scenario anticipates an even greater adaptation capacity and applies a vulnerability of 80%. As the mean costs have been already reduced very significantly along the period 1987-2016, it is deemed difficult to reduce vulnerability much beyond these percentages.

Consistent with this, the results of this projection are given in table 2.

#### Projection: total series 2017 - 2046

Amounts in M€ as of 31 Dec 2016

SCENARIO	SUM AT RISK	LOSS: FLOOD AND WIND	FREQUENCY (‰): FLOOD AND WIND	LOST RATIO (%)
100% Compensations	221,249,580	17,280	0.08	62%
90% Compensations	221,249,580	15,552	0.07	56%
80% Compensations	221,249,580	13,824	0.06	50%

Table 2: Results of the projection.

Loss ratio (hydrometeorological-caused loss divided by the total surcharge income) is expected to change, from 49% in the last 30 years (Table 1) to 62%, 56% or 50% in the next 30 years, according to the vulnerability scenarios considered (Table 2).

### 3. Discussion of baseline and next-30 years' projection, allocating theoretically a share of surcharges to hydrometeorological causes

Recalling that 100 % of the CCS income from surcharges devoted to cover extraordinary risks (hydrometeorological causes, other natural causes and human causes) is available for any of the events that might occur, regardless of their nature, it is nevertheless interesting to make the theoretical exercise to allocate a share of surcharges specifically to flood and strong wind perils.

This allocation has been done in accordance with the outcome arisen from a March 2014 internal report on financial impact of catastrophic risks in CCS, according to which 31 % of surcharges ought to be attributable to flooding risk and 33 % to that associated with strong winds.

Both baseline and hypothetical results are shown in Table 3 below:

#### Baseline with allocation of income to hydrometeorological causes

Amounts in M€ as of 31 Dec 2016

SERIES	SUM AT RISK	LOSS: FLOOD AND WIND	FREQUENCY (‰): FLOOD AND WIND	THEORETICAL LOSS RATIO (%): FLOOD AND WIND
1987 - 2016	97,805,578	6,872	0.07	76%

#### 2017 - 2046 Projection with allocation of income to hydrometeorological causes

Amounts in M€ as of 31 Dec 2016

SCENARIO	SUM AT RISK	LOSS: FLOOD AND WIND	FREQUENCY (‰): FLOOD AND WIND	THEORETICAL LOSS RATIO (%): FLOOD AND WIND
100% Compensations	221,249,580	17,280	0.08	97%
90% Compensations	221,249,580	15,552	0.07	87%
80% Compensations	221,249,580	13,824	0.06	77%

Table 3: Results considering the theoretical allocation of a share of surcharges to hydrometeorological causes.

The theoretical loss ratio (hydrometeorological-caused loss divided by the allocated share of surcharges to those causes) would change, from 76% in the last 30 years (Table 3, up) to 97%, 87% or 77% in the next 30 years, according to the vulnerability scenarios considered (Table 3, down).

## Conclusions

Even when projected loss ratios reflect increases for all three scenarios considered, there would be some margin left -without the need to modify the CCS extraordinary risk coverage scheme- to cushion a rise in the hazard level with respect to property damage (as a result of an increase in the frequency or strength of floods or strong winds due to foreseeable climate change).

Also, these results would allow, where appropriate, to consider the possibility of lowering the tariff for the coverage of extraordinary risks, taking the support of the equalization reserve into account.