Information and methodology of sigma explorer data

How to use sigma-explorer.com

There is a short video explaining the main functionalities.

Data set

The web application www.sigma-explorer.com contains data from the annual *sigma* reports on natural catastrophes (catastrophe database) and on the world insurance markets (world insurance database; see institute.swissre.com/sigma). In the case of the catastrophe database, only a subset of the individual catastrophes is shown, ie the twenty largest events for each year by the number of victims, by insured losses or by total losses (excluding events from the US).

Catastrophe database: terms and selection criteria

A natural catastrophe is caused by natural forces.

Natural catastrophes
The term "natural catastrophe" refers to an event caused by natural forces. Such an event generally results in a large number of individual losses involving many insurance policies. The scale of the losses resulting from a catastrophe depends not only on the severity of the natural forces concerned, but also on man-made factors, such as building design or the efficiency of disaster control in the afflicted region. In this *sigma* study, natural catastrophes are subdivided into the following categories: floods, storms, earthquakes, droughts/forest fires/heat waves, cold waves/frost, hail, tsunamis, and other natural catastrophes.

A man-made or technical disaster is triggered by human activities.

Man-made disasters
Major events associated with human activities are categorised as "man-made" or "technical" disasters. Generally, a large object in a very limited space is affected, which is covered by a small number of insurance policies. War, civil war, and war-like events are excluded. *sigma* subdivides man-made disasters into the following categories: major fires and explosions, aviation and space disasters, shipping disasters, rail disasters, mining accidents, collapse of buildings/bridges, and miscellaneous (including terrorism). In Tables 8 and 9 (pages 26– 44), all major natural catastrophes and man-made disasters and the associated losses are listed chronologically.

Losses due to property damage and business interruption that are directly attributable to major events are included in this study.

Total losses
For the purposes of the present *sigma* study, total losses are all the financial losses directly attributable to a major event, ie damage to buildings, infrastructure, vehicles etc. The term also includes losses due to business interruption as a direct consequence of the property damage. Insured losses are gross of any reinsurance, be it provided by commercial or government schemes. A figure identified as "total damage" or "economic loss" includes all damage, insured and uninsured. Total loss figures do not include indirect financial losses – ie loss of earnings by suppliers due to disabled businesses, estimated shortfalls in GDP and non-economic losses, such as loss of reputation or impaired quality of life.

The amount of the economic losses is a general indication only.

Generally, total losses are estimated and communicated in very different ways. As a result, they are not directly comparable and should be seen only as an indication of the general order of magnitude.

The term “losses” refer to insured losses, but do not include liability.

Insured losses
"Losses" refer to all insured losses except liability. Leaving aside liability losses, on one hand, allows a relatively swift assessment of the insurance year; on the other hand, however, it tends to understate the cost of man-made disasters. Life insurance losses are also not included.

NFIP flood damage in the US is included.

NFIP flood damage in the US
The *sigma* catastrophe database also includes flood damage covered by the National Flood Insurance Program (NFIP) in the US, provided that it fulfils the *sigma* selection criteria.Selection criteria

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sigma has been publishing tables listing major losses since 1970. Thresholds with respect to casualties – the number of dead, missing, severely injured, and homeless – also make it possible to tabulate events in regions where the insurance penetration is below average.

Thresholds for insured losses and casualties in 2016

For the 2016 reporting year, the lower loss thresholds were set as follows:

Insured losses (claims):

	Maritime disasters	USD 19.9 million
	Aviation	USD 39.8 million
	Other losses	USD 49.5 million
or	Economic losses:	USD 99.0 million
or	Casualties:	
	Dead or missing	20
	Injured	50
	Homeless	2000

Losses are determined using year-end exchange rates and are then adjusted for inflation.

Adjustment for inflation, changes to published data, information

sigma converts all losses for the occurrence year not given in USD into USD using the end-of-year exchange rate. To adjust for inflation, these USD values are extrapolated using the US consumer price index to give current (2016) values.

This can be illustrated by examining the insured property losses arising from the floods which occurred in the UK between 29 October and 10 November 2000:

Insured loss at 2000 prices: USD 1045.7million

Insured loss at 2016 prices: USD 1457.5 million

Alternatively, were one to adjust the losses in the original currency (GBP) for inflation and then convert them to USD using the current exchange rate, one would end up with an insured loss at 2016 prices of USD 1 192.5 million, 18% less than with the standard *sigma* method. The reason for the difference is that the value of the GBP declined by almost 18% against the USD in the period 2000-2016, i.e. less than the difference in inflation between the US (39.4%) and the UK (38.5%) over the same period.

Figure 9
Alternative methods of adjusting for inflation, by comparison

Floods UK		Exchange rate		US inflation	
29 October - 10 November 2000	GBPm	USD/GBP	USDm	USDm	
Original loss	700.0	1.494	1,045.7	1,045.7	
Level of consumer price index 2000	72.7			100.0	
Level of consumer price index 2016	100.7			139.4	
Inflation factor	1.385			1.394	
Adjusted for inflation to 2016	969.3	1.230	1,192.5	1,457.5	
Comparison			82%	100%	

Source: Swiss Re Economic Research & Consulting.

Changes to loss amounts of previously published events are updated in the *sigma* database.

If changes to the loss amounts of previously published events become known, *sigma* takes these into account in its database. However, these changes only become evident when an event appears in the table of the 40 most costly insured losses or the 40 disasters with the most fatalities since 1970 (See Tables 10 and 11 on pages 45-46).

Only public information used for man-made disasters

In the chronological lists of all man-made disasters, the insured losses are not shown for data protection reasons. However, the total of these insured losses is included in the list of major losses in 2016 according to loss category. *sigma* does not provide further information on individual insured losses or about updates made to published data.

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Newspapers, direct insurance and reinsurance periodicals, specialist publications and other reports are used to compile this study.

Sources

Information is collected from newspapers, direct insurance and reinsurance periodicals, specialist publications (in printed or electronic form) and reports from insurers and reinsurers. In no event shall Swiss Re be liable for any loss or damage arising in connection with the use of this information (see the copyright information on page 2).

Exchange rate used[1], national currency per USD

Country	Currency	Exchange rate, end 2016
United Arab Emirates	AED	3.6724
Australia	AUD	1.3808
Canada	CAD	1.3408
Europe	CHF	1.0162
China	CNY	6.9444
Costa Rica	CRC	555.5556
Egypt	EGP	18.1488
Eurozone	EUR	0.9481
Fiji	FJD	2.1142
United Kingdom	GBP	0.8089
India	INR	68.0272
Japan	JPY	116.2791
South Korea	KRW	1250.0000
Sri Lanka	LKR	149.2537
New Zealand	NZD	1.4339
Oman	OMR	0.3850
Philippines	PHP	49.5050
Qatar	QAR	3.6417
Russia	RUB	60.9756
Tonga	TOP	2.3095
Taiwan	TWD	32.3625
U.S.A.	USD	1.0000
South Africa	ZAR	13.6799

[1] The losses for 2016 were converted to USD using these exchange rates. No losses in any other currencies were reported

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World insurance: Methodology and Data

The premium data in sigma-explorer *sigma* is based on the direct premium volume of insurance companies, regardless of whether they are privately or state owned. Premiums paid to state social insurers are not included. Life and non-life premium volume in 147 countries is examined. Detailed information on the largest 88 countries in terms of total insurance premium volume can be found in the statistical appendix.

Country classifications generally follow IMF conventions.

The designation of the economies mentioned in this *sigma* as "advanced" or "emerging" is generally in keeping with the conventions of the International Monetary Fund (IMF). Advanced economies include the US, Canada, Western Europe (excluding Turkey), Israel, Oceania, Japan and the other advanced Asian economies (Hong Kong, Singapore, South Korea and Taiwan). All other countries are classified as "emerging" and generally correspond to the IMF's "emerging and developing" economies.[2]

Data sources

The insurance data and estimates contained in the study originate primarily from national supervisory authorities and, in some cases, from insurance associations. Macroeconomic data was sourced from the International Financial Statistics of the IMF, Oxford Economics and IHS-Markit.

Data revisions

Figures for past years are adjusted as new information becomes available. The data in sigma-explorer is updated after the publication of the world insurance sigma at the end of June on insitute.swissre.com/sigma.

Definition of premium income

Sigma-explorer premium data is based on information concerning the premiums written for direct business by all registered insurers. This means:

1. Direct insurance premiums, including commissions and other charges, are considered prior to cession to a reinsurance company.
2. Domestic insurers – regardless of their ownership – and domestic branches of foreign insurers are regarded as domestically domiciled business units. By contrast, business undertaken by the foreign branches of domestic insurers is not regarded as domestic business.
3. Business that has been written in the domestic market includes premiums for cover of domestic risks as well as those covering foreign risks, as long as they are written by domestic insurers (cross-border business).

Health insurance is allocated to non-life business.

Life and non-life business areas in sigma explorer are categorised according to standard EU and OECD conventions: health insurance is allocated to non-life insurance, even if it is classified differently in the individual countries.

Density and penetration do not include cross-border business.

Only premium income from domestic risks is used to calculate insurance penetration and density. Cross-border business is not included. This has a significant effect in Luxembourg, Italy and Ireland.

Growth rates in local currency are adjusted for inflation.

Real growth rates are calculated using premiums in local currencies and adjusted for inflation using the consumer price index for each country. Regional aggregated growth rates are calculated using the previous year's premium volumes and converted into US dollars at market exchange rates. The same procedure applies to the economic aggregates, where the previous year's nominal GDP figures in US dollars are used as weights.

Figures are converted into US dollars to facilitate international comparisons.

Using the average exchange rate for the financial year, premium volumes are converted into US dollars to facilitate comparisons between markets and regions.[3] Where no premium data is available (indicated by "na." for the local currency value in the tables), the premium income in US dollars is estimated assuming a constant ratio of insurance

[2] The only exceptions are the Czech Republic, Estonia, Slovenia and Slovakia.

[3] In Egypt, India, Iran, Japan, South Korea and Malaysia, the financial year is not the same as the calendar year. Precise details about the differences in dates are given in the notes to the statistical appendix.

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premiums to GDP. Regional growth rates are calculated using a weighted average of the real growth rates of the individual countries. The weighting is based on the relevant premiums of the previous year in USD.

The statistical appendix of the world insurance sigma contains additional calculations and the macroeconomic data used for currency conversions.

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