



Methodology

Calculating the insurance gap

	Insurance penetration 2018 report	Insurance penetration 2012 report	Penetration difference	Rank 2018 report	Rank 2012 report	Rank change
Netherlands	7.7	9.5	-1.8	1	1	0
South Korea	5.0	4.6	0.4	2	3	-1
United States	4.3	4.1	0.2	3	4	-1
New Zealand	4.2	5.2	-1.0	4	2	2
Canada	4.1	4	0.1	5	5	0
Australia	3.5	3	0.5	6	10	-4
Taiwan	3.4	3.1	0.3	7	8	-1
Germany	3.4	3.6	-0.2	8	6	2
Hong Kong	3.4	1.4	2	9	31	-22
France	3.2	1.9	1.3	10	20	-10
Austria	3.0	3.2	-0.2	11	7	4
Spain	2.8	2.7	0.1	12	12	0
United Arab Emirates	2.8	1.5	1.3	13	28	-15
Denmark	2.8	2.9	-0.1	14	11	3
South Africa	2.7	2.7	0	15	12	3
United Kingdom	2.4	3.1	-0.7	16	8	8
Japan	2.3	2.2	0.1	17	18	-1
Israel	2.3	2.4	-0.1	17	14	3
Argentina	2.3	2.3	0	19	15	4
Italy	2.1	2.3	-0.2	20	15	5
Poland	2.1	1.9	0.2	21	20	1
Morocco (was not included in 2012 report)	2.1	-	-	22	-	-
Columbia	2.0	1.6	0.4	23	27	-4
China	1.9	1.2	0.7	24	32	-8
Sweden	1.8	1.9	-0.1	25	20	5
Chile	1.8	1.8	0	26	23	3
Brazil	1.8	1.5	0.3	27	28	-1
Norway	1.8	1.7	0.1	28	25	3
Thailand	1.7	1.7	0	29	25	4
Singapore	1.6	1.5	0.1	30	28	2
Malaysia	1.4	1.8	-0.4	31	23	8
Saudi Arabia	1.4	1	0.4	32	35	-3
Turkey	1.2	1.1	0.1	33	33	0
Mexico	1.2	1.1	0.1	34	33	1
Ireland	1.2	2.2	-1.0	35	18	17
Russia	1.0	2.3	-1.3	36	15	21
India	0.9	0.7	0.2	37	37	0
Vietnam	0.8	0.9	-0.1	37	36	1
Philippines	0.6	0.4	0.2	39	40	-1
Indonesia	0.5	0.6	-0.1	40	38	2
Egypt	0.4	0.4	0	41	40	1
Nigeria	0.2	0.5	-0.3	42	39	3
Bangladesh	0.2	0.2	0	43	42	1

Working out insurance penetration rates

The first step taken to calculate underinsurance levels is to analyse the insurance penetration of countries.

The insurance penetration ratios are calculated based on data for non-life insurance premiums taken from the Sigma World Insurance report by Swiss Re, which examines the global insurance markets. Life and non-life business areas in the Sigma study are categorised according to standard EU and OECD conventions. 'Non-life' therefore includes accident, health and motor insurance.

Not all business areas are exposed to risks from natural catastrophes in the same manner. In countries where the insurance mix is skewed towards business areas that are relatively less affected by natural catastrophes, local underinsurance findings may differ to those published in this report. The latest Sigma report from 2018 reports insurance penetration measured as the volume of insurance premiums as a percentage of GDP.

The table opposite highlights the changes in insurance penetration data across the countries analysed.

Calculating expected losses from natural catastrophes

To put the level of insurance penetration into context, it needs to be compared to levels of risk exposure.

Given that the ultimate aim of the analysis is to establish which countries show the largest gaps in their non-life insurance cover, simply looking at insurance penetration ratios is insufficient. For example, a country could well have a higher insurance penetration than its neighbouring country – however, if said country also faces higher risk from flooding, earthquakes, wildfires or other natural catastrophes, it is not easy to establish which one has a higher insurance gap.

As in the Lloyd's 2012 Underinsurance Report, data has been sourced from the EM-DAT database on natural catastrophes and the economic costs caused by them, in order to establish a risk measure on a country level¹. For each country, the list of the 10 most costly natural catastrophes since the beginning of the 20th century has then been updated. Economic cost is here defined as the value of all damages and economic losses directly or indirectly related to the disaster. To put the economic losses into context, they have been expressed as a share of nominal GDP of the year in which the disaster occurred. The average loss across the 10 costliest catastrophes has then subsequently been adjusted for the frequency with which these disasters occur.

The adjustment is made by taking the average percentage loss and dividing by the calculated frequency with which a highly destructive disaster occurs, arrived at by dividing the difference in years between the earliest and most recently occurring catastrophes by the number of catastrophes (i.e. 10). This yields the expected loss per year. E.g. if the average loss of GDP across the 10 costliest catastrophes is 2% of nominal GDP, and catastrophes of this dimension occur every five years, the expected loss per year is 0.4% of GDP.

From this, an expected annual loss per year due to highly destructive natural disasters has been estimated.

Expected loss from disaster = probability of natural disaster x cost associated with natural disaster.

¹ "EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium," accessed May 2018

Benchmarks	Countries	2017 GDP per capita, constant US dollars	Average non-life insurance penetration 2007–2017	Expected loss	Expected loss non-life insurance penetration	Benchmark requirement
High income	Hong Kong	\$ 36,776	1.9%	0.0%	1.9%	1.9%
	Singapore	\$ 52,601	2.0%	0.0%	2.0%	1.9%
	United Arab Emirates	\$ 40,864	1.8%	0.0%	1.8%	1.9%
	Israel	\$ 33,677	2.3%	0.0%	2.2%	1.9%
Middle income	Russia	\$ 11,280	1.4%	0.1%	1.3%	1.5%
	Saudi Arabia	\$ 21,395	1.0%	0.0%	1.0%	1.5%
	Egypt	\$ 2,724	0.4%	0.1%	0.3%	1.5%
Low income	Malaysia	\$ 11,032	1.6%	0.1%	1.5%	1.5%
	South Africa	\$ 7,489	2.7%	0.1%	2.6%	1.5%

Determining the insurance gap

From this, the level of underinsurance can be calculated by subtracting the expected losses from the insurance penetration, given that both measures are expressed as a share of GDP.

Following this methodology, countries where expected losses exceed insurance coverage can be defined as 'underinsured'. Similarly, countries where insurance penetration exceeds expected annual losses are 'over-insured'.

However, this method of adjusting for expected losses assumes that countries have similar preferences for insurance consumption independent of their income levels. The analysis in the report allows for varying demand for insurance for three income groups – low, medium and high GDP per capita (see table, left). The thresholds for the groups are based on the original report, allowing for a certain degree of global economic growth in order to keep relative positions broadly similar. I.e. in 2012, the methodology counted a country with an income of at least \$30,000 per capita among the high-income countries. In the current report we have increased this threshold to \$35,000. The threshold between medium and low-income countries has similarly increased from \$10,000 to \$11,100 in the current report.

In line with the methodology from the first Lloyd's underinsurance report from 2012, this report uses a benchmark for each of the three income groups to compare insurance levels within these groups.

The benchmark in the original report was defined as the 10-year average adjusted insurance penetration ratio of the three countries with the lowest expected annual loss from natural catastrophes for each of the three income groups. The reasoning behind this choice was that the countries with the lowest expected loss are less likely to be underinsured and therefore provide a useful benchmark of insurance penetration that should be achieved by other countries at similar income levels. To prevent a single outlier from distorting the results, the average is taken across three countries per income group. In order to preserve comparability across time, we kept the country selection unchanged and have updated only expected loss ratios and average non-life insurance penetration ratios to reflect any changes in insurance levels in the selected countries.

The relevant benchmark countries are shown in the table opposite. Compared to the benchmarks used in the 2012 report, due to the increase in insurance penetration in Singapore and Hong Kong, the benchmark requirement has increased from 1.5% to 1.9% for high income countries. For the middle-income country group, the insurance trends have moved in the opposite direction with Russia and Israel posting significantly lower insurance penetration ratios than in 2012. As such, the benchmark requirement has dropped from 1.9% in the 2012 report to 1.5%. Similarly, due to decreases in the average insurance penetration ratio for Malaysia and South Africa, the benchmark for low-income countries has decreased from 1.6% to 1.5%.

Calculating the insurance cover of various industry sectors

This report aims to shed some light on the issue of how well protected different sectors are against risk; however, insurance premium data is not available in great detail at the level of industries within the economy.

As such, this analysis relies on the creation of a similar method of comparison used in establishing insurance penetration for individual countries. The ratio of insurance expenditure in each industry to the total output of the industry is calculated as a measure of the industrial insurance penetration of the industry.

This research does not attempt to measure underinsurance, which would require considerable analysis of the particular risks faced by each industry, in each country. However, it forms the foundation for a detailed discussion of this issue, based on the relative penetration levels of each industrial sector.

In order to examine the level of industrial insurance penetration in each sector within each country, the analysis makes extensive use of the input-output tables of each country. These tables detail the inputs each industry requires to produce their final output. The expenditure of each industry on insurance is assumed to indicate the level of insurance of that industry in the absence of specific data relating to insurance premiums. The complex nature of the production of the input-output tables for each country means that there is a time lag – usually at least two years – between the year that the tables relate to and their release. The 2013 input-output tables are the most widely available for the sampled countries. As such, for ease of comparison, it is the 2013 tables that have been used to compile the estimated insurance levels.

The input-output tables estimate only the expenditure of businesses on insurance, therefore all expenditure is assumed to encompass only non-life insurance expenditure. Furthermore, industries' use of captives or self-insurance will not be captured by the input-output framework. This is due to the nature of self-insurance being a transfer of funds as opposed to direct insurance premium expenditure.

From each national table, smaller industries have been aggregated into larger sectors to resemble as closely as possible the sectors representing the Standard Industrial Classifications 2007 (SIC 2007). Following the aggregation of the industries into these classifications, the insurance expenditure of each of the 16 sectors is calculated². Using this information and the total output for the sector, a measure of insurance expenditure as a percentage of the total output of the industry is calculated. This gives a measure of insurance expenditure as a percentage of the total economic activity of the sector or the industrial insurance penetration of each industry.

² Note that the expenditure of the 'Financial and insurance activities sector' excludes the expenditure of the insurance sector on insurance. This is to avoid the distortions caused by larger domestic insurance markets and expenditure on reinsurance, which may inflate the calculations of the expenditure on insurance within the sector. This is also the case for calculations of the average industrial insurance penetration across countries.

Sources of national input output tables

- Australia: Australian bureau of statistics, <http://www.abs.gov.au/>
- Canada: Statistics Canada, <http://www.statcan.gc.ca>
- European nations: Eurostat, <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>
- New Zealand: Statistics New Zealand, <http://www.stats.govt.nz/>
- Singapore: Department of statistics Singapore, <http://www.singstat.gov.sg/stats/themes/economy/natac.html>
- Turkey: Turkish Statistical Institute, <http://www.turkstat.gov.tr/Start.do>
- United States: Bureau of economic analysis, http://www.bea.gov/industry/io_benchmark.htm