Modelling the 2017 losses: recurrence estimates vary widely

Is the combination of the Harvey, Irma and Maria (HIM) hurricanes a once-in-a-career event for reinsurance underwriters or likely to happen more often?

There seems to be as much variation in the responses to this question as there is on how much the losses will cost (re)insurers overall.

Rather than giving the probability of exceeding a given loss in a *single* year, return periods indicate how many years might pass between such losses occurring.

Reinsurer Validus said its incurred loss suggested events of this magnitude occur about once every 32 years, but for its peers the range appeared to be closer to 49 years to once every 106 years.

"Our peers seem to think this type of wind season will only happen once in their careers, while we see it as twice as likely, and we set our risk appetites accordingly," said Validus CEO Ed Noonan, according to a Seeking Alpha transcript of the firm's third quarter earnings call.

Noonan said that weak levels of industry disclosures made it difficult for investors and analysts to compare (re)insurers' risk profiles on an apples-to-apples basis. Some companies report only regional probable maximum losses (PMLs), while others disclose event PMLs.

ILS manager Twelve Capital gave a view that was close to the Validus 32-year figure. Taking $100bn as a baseline for insured HIM losses suggested an annual exceedance probability of around 2.5 percent, which meant a hurricane season as costly as 2017 would occur once every 40 years, Twelve said.

But Fermat Capital co-founder John Seo argued that this year's losses were modelling closer to a 1-in-10-year aggregate loss.

"If we put 2017 alongside 1992, 2005 and 2011, we would be seeing four similar or greater loss years across three decades."

The 2017 loss experience has primarily highlighted the extent to which some retro strategies are far more exposed to a 1-in-10-year aggregate loss than they are to a 1-in-100-year single hurricane loss.

"This was primarily a retro event," Seo said. "Retro events should be expected to happen every three to eight years."

The modelling agencies have differing estimates of the return periods for the three major storms (see table) and they have not published a return period for the events combined.

Return periods

| Modelling company | Harvey | | | Irma | | | Maria | | |
	Harvey (years)	Insured loss ($bn)	Area	Irma (years)	Insured loss ($bn)	Area	Maria (years)	Insured loss ($bn)	Area
Karen Clark	~ 25	15	Texas	~ 10	15	Florida	~ 200	28	Puerto Rico
RMS	1000	25-35	Texas	10	35-55	Caribbean, US	150-400	15-30	Puerto Rico

Source: Karen Clark, RMS

As an example of the variation, RMS said Maria – for all perils – was considered a 150- to 400-year event for Puerto Rico and a 30- to 125-year event for the Caribbean region.

Karen Clark & Company put Maria losses at $28bn, which it calculated represented an estimated return period of around 200 years for Puerto Rico hurricane events.

For Irma, modellers' views are within a narrower range.

RMS and KCC both see Irma as a 1-in-10-year event for all perils (wind and surge and inland flood) in Florida, but their loss estimates differ. CoreLogic puts Irma insured losses at $14bn to $19bn, which it says is an eight- to 11-year event.

Behind the loss numbers

The variation in simple industry loss estimates for each hurricane also goes some way towards explaining the different return periods that have been given for the events.

For Maria, RMS estimated insured losses at $15bn-$30bn while AIR Worldwide put the figure at $40bn-$85bn, of which losses for Puerto Rico were estimated at $35bn-$75bn.

Hurricane Maria has revealed vastly different assumptions taken by AIR and RMS on the vulnerability of buildings in Puerto Rico, how quickly the island will recover and how much that recovery will cost.

On a reconnaissance trip to the island shortly after the hurricane, an RMS team found the Puerto Rican capital San Juan mostly operational, but AIR said the cost of Puerto Rico getting back on its feet could be significant. "After an event of this size, cost of repair and cost of labour is not the same as before the event, as you have shortages on the island," said Cagdas Kafali, senior vice president in AIR's research and modelling group.

Modelling involves determining the hazard, vulnerability, exposure and locations of risk impacted by an event.

However, Andrew Castaldi, head of catastrophe perils, Americas at Swiss Re, said that there should be a fifth box – the modelling of the unexpected components of an event, which he termed "chaos modelling".

"For example, engineering studies are looking at a particular building and how it will react within a wind field. In reality, you would have many other structures around it, for example, gravel in the roof which turns into debris," he added.

"How is your risk impacted by an event when it is surrounded by a community of other risks?"

Some might say that's underwriting judgement, but others might say it belongs in a model, he continued.

Castaldi went so far as to say that by not looking at the exaggerations that could occur, insurers could be leaving themselves in jeopardy.

HIM loss estimates

RMS

Harvey: 25, 21.5, 18
Irma: 49.5, 41, 32.5
Maria: 30, 22.5, 15
HIM combined: 104.5, 85, 65.5

Source: *The Insurance Insider*

AIR Worldwide

Harvey: 10
Irma: 50, 41, 32
Maria: 85, 62.5, 40
HIM combined: 135, 103.5, 72