



## Managing Earthquake Exposure

by Claire Abel, Gen Re, London

Property underwriters tend to develop expertise through underwriting fire risks. As professionals, we become comfortable that we understand the estimated maximum loss (EML) of fire damage; we have sufficient data to determine reasonable loss costs, and we can reserve for our fire claims appropriately. We take comfort from the short-tail nature of our portfolios and for our ability to modify pricing as required over the medium term.

Earthquake (EQ) losses have the power to disrupt this predictability at any moment in time. These events can have a dramatic impact on our bottom-line result. They also challenge our assumptions around risk-taking, loss distribution and claims settlement. What should we be looking for from those who manage our earthquake portfolios? Using our experience from multiple countries, cedants and risks, we have identified some key areas for review:

- Underwriting is more than risk modelling.
- Reserving earthquake claims is challenging.
- Tail risk increases as claimants push definition of damage.

### Shake off the fire-based thinking

**Buildings sums insured** are set to reinstate insured property following fire damage. This is an inadequate approach when providing EQ cover. In an earthquake event, there will be widespread disruption within a region. Access roads, suppliers and local governments may all be affected. Competition for loss adjustors, engineers and contractors will be intense. Non-existent after fire incidents, this demand surge will substantially impact the cost of each EQ claim.

**Business Interruption (BI) indemnity periods** are chosen assuming that loss mitigation and reinstatement will begin without delay. This is unlikely following earthquake damage where communities are hit by loss of life and extreme chaos. Building codes

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### About This Newsletter

Created for our clients, our Property Matters publication provides an in-depth look at timely and important topics affecting commercial and personal lines of property insurance.

will also need revisiting. A year of BI insurance coverage can easily be exhausted before any restoration gets underway.

**Risk presentations** may fall short. Underwriters, brokers and risk surveyors are not structural engineers, and most risk presentations arrive on underwriters' desks without the necessary components to enable an assessment of earthquake exposure with any confidence. This includes structural information, details on building codes, retrofitting, and underlying soil conditions. To make matters more challenging, bundled risk submissions may have very minimal information on each building.

### Know the limitations of the models

Models are used, and are often mandatory, to help underwriters assess risk pricing up-front, and to measure aggregate loss expectancies across a portfolio. The quality of information presented, and the way it is interpreted for use within the model, will combine to have a huge impact on results. Actual input is often delegated to risk modellers with superior database skills and the ability to overcome geocoding difficulties to provide accurate location information on risks. How much do we encourage our underwriters to think about the data that will go in, including coverage extensions not detailed in a schedule of locations, and about the results they receive back from this "black box"?

**Models predict shake damage** fairly well for differing types of construction in a given event. They would be able to perform better if more reliable structural information was made available in risk submissions. There are, however, other elements where modelling is less successful:

- **No model explicitly accounts for aftershocks.** Models predict earthquakes at known faults based on observed historical activity combined with instrumental seismicity. However, once an earthquake has struck, seismic activity could be elevated above the historical long-term average for a period of time, as seen in New Zealand, Italy and Nepal. Underwriters should consider the impact of aftershocks within the same policy year, and also acknowledge heightened risk if writing in an area that has suffered an earthquake in preceding year(s).
- **Models do not currently take adequate account of damage caused by settlement following liquefaction.** Damage as a result of liquefaction goes one of two ways: minimal or virtually 100% building loss. This phenomenon, evidenced in Christchurch, could repeat itself in many areas of the world where cities have grown up along the banks of a river or along coastlines, such as Hong Kong, San Francisco and Boston. The loss an insurer faces could deviate quite significantly from the average loss predicted by the model, especially where the portfolio is relatively small.
- **Tsunami models exist, but they are not widely used in the insurance industry today.** In the Japanese quake of 2011, roughly 30% of damage was caused by the devastating tsunami that travelled up to 10 km inland. Chile saw significant tsunami claims as water was driven up within the bay at Concepcion. At Gen Re our claims for tsunami were greater than our claims for shake damage in Chile. Are your underwriters equipped with the means to understand whether their risks are exposed to tsunami in addition to modelled shake damage?
- **BI is tough to model.** Estimates are made as to the number of weeks a particular occupancy type may be affected, but 12 months can pass before there is even any agreement as to whether reconstruction is going to be possible on the existing site. The impact on businesses does not happen in isolation: their recovery is in large part affected by the speed of recovery of their suppliers and customers and the recovery of the transportation facilities they need.
- **Building codes** are credited by the models as they can greatly improve the ability of a building to withstand damage. However, at Gen Re we have paid for total losses where the actual construction was poorer than the design code. Compliance to code cannot be guaranteed to the extent we would like.
- **Our timeframe is too short.** Movement in the Earth's surface occurs over millennia and cannot be observed, measured or predicted to the same degree as weather patterns. Earthquake modelling will always be less reliable than US hurricane modelling and even hurricane models, with more years of data behind them, have their shortcomings.

- **Undiscovered fault lines.** Christchurch was not supposed to happen. Experts knew of the Alpine fault line to the north of Christchurch, but no such exposure was perceived within Christchurch. Building codes were not as strong in this region, and models did not anticipate or price for the strength of events that occurred.

### Do you have an average portfolio?

Earthquake damage to any one building can vary from zero to total. The curves of damage found in models assume a healthy portfolio of risks in an area. As we have seen above, actual loss experience can differ greatly from the expected mean unless we are permitted to take the viewpoint of thousands of years of results, or if we have the benefit of thousands of exposures within a region. Writing excess of loss layers can compound this difficulty as we are pushed further into the tail of the risk. For all who have only sporadic exposure within a region, actual damage may swing wildly up or down from the Average Annual Loss.

### Challenges of reserving for earthquake claims

**Early loss estimates** are unreliable. Unlike damages in hurricanes or floods, earthquake damage is largely hidden beneath ground and behind internal finishings. Claims teams cannot make a quantitative assessment until a structural engineer's report is completed. As insurers, we are pushed for immediate loss estimates. These will likely need later revision, potentially damaging confidence in our industry's ability to manage our exposures.

**Local experts** can be difficult to get hold of after a major claim, something that was evident in the New Zealand earthquakes. In the US, loss adjusters must be licensed to settle earthquake claims in California. Globally, there are not enough licensed loss adjusters to cope if there is a California earthquake. Understanding local conditions and having a catastrophe management plan in place will be key for insurers.

**Allocation of losses to separate events** is challenging. Depending on the frequency of aftershocks, and how quickly a location has been assessed by a structural engineer, it can be difficult to accurately allocate damage to individual events. The outcome will have implications for deductibles,

excess layer and reinsurance recoveries, making an insurer's net loss harder to estimate.

**Reinstatement**, where earthquakes are covered on an each loss basis and a building is successively destroyed by a series of earthquakes and aftershocks, can mean that an underinsured claimant receives multiple payouts. We have seen cases receive full restoration beyond the total sum insured of their policy and without penalty for underinsurance.

### Inflated claim demands through new definitions of damage

There is an undeniable stigma of having an earthquake-damaged building. Regardless of policy language and the meaning of indemnity, insureds will ultimately seek a total loss payout to allow them to set up fresh in a new location. They will be looking for all arguments to support a full payout. In Christchurch, we have seen new definitions of damage brought forward by claimants that insurers have to consider and to potentially contest.

Foundation damage, increased flood risk, slight cracking, slight unevenness – what reasonably constitutes actual damage and what should be immaterial? These questions are currently being played out within the New Zealand courts, with engineering experts and lawyers arguing on either side. What would a US jurisdiction decide if the same were to happen in California? Insurers may well find that the courts interpret wordings very favourably for our insureds and the definition of damage may be stretched further than anything we have seen to date.

### Are you underwriting or simply modelling earthquake?

As we can see above, there are a number of factors that can have an outsized effect on your portfolio of EQ risks. Is your team accounting for demand surge and delayed BI recovery? Do you address extensions of cover that also add to claims beyond the values declared under PD & BI? How do you price for aftershocks? Tsunami? Liquefaction? Are you participating in excess layers where highly volatile individual losses can impact results so dramatically? Should you allocate more capital to your earthquake portfolio, knowing that the models are only truly able to assess shake damage?

While we believe that models are crucial to help manage earthquake exposures, there is also a risk of over-reliance on models and a sense of blindness as underwriters take the output and use it as is.

At Gen Re we have first-hand experience of the incredible tail exposure in an earthquake portfolio, far beyond the Average Annual Loss that a model will predict. We endeavour to learn from these lessons, and we would like to share our experience with our partners around the globe.

If you want to talk more about underwriting earthquake exposure or investigate facultative solutions, then get in touch with your local Gen Re underwriter.

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