Extreme Claims

The UK floods in 2007 are estimated to have cost insurers £2billion and are now reckoned to have been a "1 in 200 year" UK flood event. How do insurers price for such "extreme" claims with hardly any past claims data to go on? How does this affect the insurance coverage and premiums for local authorities' property and liability risks?

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"Extreme" events have been at the forefront of many UK news stories:

*   Investment bank trading (extreme losses from a "rogue" trader) – (Societe Generale, January 2008)
*   "Sub-prime" losses (extreme downward price movements) – UK/USA (December 2007)
*   Flooding (an extreme volume of water in a given location) – UK floods (Summer 2007)
*   Terrorist attacks of 9/11 (2001)

For local authorities, an "extreme" claim could be a major flood, storm or terrorism event (potentially up to the sums insured in a particular location), a multi-million pound liability claim, or perhaps a series of serious claims from the same incident, aggregating to millions of pounds. On a smaller scale, taking motor own damage insurance as an example, an "extreme" incident for one local authority has been an explosion in a car park, destroying ("writing-off") many vehicles at the same time, triggering payment of several (relatively high) deductibles in a single incident, twice the "normal" annual loss cost for the entire fleet.

Extreme Value Theory
In order to set premiums, insurers (and their reinsurers) therefore require estimates of how "extreme" the values might be over a given time period (e.g. how bad would a "1 in 200 year" UK flood event be?).

Extreme Value Theory (EVT) provides a mathematical framework for estimating probabilities of these more extreme future events. The mathematics is complex and we will not be going into the detail here, but suffice to say that this framework is at the cutting-edge of mathematical/actuarial research into setting premiums for rare events. However, there is no proven empirical or physical basis to support this framework; it uses mathematical assumptions about the behaviour of very large numbers of events (i.e. those events which have already happened) to extrapolate to rarer (as yet unseen) events. After all, we cannot predict the future; all we can do is make assumptions which "best" describe our view of the past.

EVT can help us to answer questions such as "What is the probability that a future (extreme) value will be more than a desired (high) threshold value, X?" Perhaps X is the desired cover limit for a local authority, or the maximum aggregation of risk an insurer is prepared to take in a high-risk location (e.g. a flood zone).

But if there is no proven empirical or physical basis to support EVT, why use it at all?

Insurance of Extreme Value Risk
Insurers are risk-takers, charging premiums to cover unknown, but potentially very large extreme future events; however they are ultimately in business to make a profit.

Although there are no maximum or minimum levels of premium allowed by law, in practice premiums are "floored" by the need to maintain minimum levels of capital. The insurance regulator in the UK (the Financial Services Authority, FSA) sets minimum levels of capital each insurer must hold in order to allow the insurer to continue trading; current minimum levels are based on 99.5th percentiles, or put another way, an insurer needs to be able to show that the probability of its' own failure in the event of a 1 in 200 year (joint asset/liability) event is less than 0.5% over the next 12 months. This "1 in 200 year event" is precisely the output of EVT modeling.

Lloyd's insurers (syndicates) must assess their "survivability" in the event of a number of prescribed "Realistic Disaster Scenarios" for example:

*   Gulf Of Mexico Hurricane (assumed Industry Loss c£60billion)
*   Los Angeles Earthquake (assumed Industry Loss c£40billion)
*   European Windstorm (assumed industry Loss c£20billion)

Due to the uncertainty surrounding the frequency and potential cost of earthquakes, Lloyd's often requires syndicates to provide loss estimates against a further 'Extreme Stress Scenario' ('ESS') in order to determine the whole market's exposure to a more extreme occurrence. The ESS, based on scientific research, is currently a Mississippi County (USA) earthquake (assumed Industry Loss c£60billion). To put these "extreme" figures into context, Hurricane Katrina is estimated to have cost insurers £20billion, with "9/11" having an insurance cost of c£35billion. Thus the insurance (and risk management) of extreme value risks demands extrapolation to rarer (as yet unseen) events; EVT is the only mathematically coherent framework we have to try to understand what these events might look like. Thus EVT is of immense interest to insurers. As new "extreme" events occur, premiums for such covers inevitably rise as the modeling teams "re-calibrate" their EVT models (e.g. recent UK floods, US hurricanes etc).

The Impact on Local Authorities
A classic practical example of the impact of extreme claims on local authorities is the relatively simple coverage of motor insurance. The realistic maximum claim previously thought possible for a single driver (with no passengers and no other motor vehicles involved) was generally thought to be £5m-£10m,

The Gulf Of Mexico Hurricane (assumed Industry Loss c£60billion)

perhaps due to severe injury to a third party, causing significant loss of future earnings and requiring many years of expensive care and rehabilitation.

In 2001, the Selby case changed this perception; the driver (Gary Hart) fell asleep at the wheel, his car careered onto a train line and was struck by an oncoming high-speed train, which derailed and in turn struck a freight train travelling on the opposite tracks. This event cost c£50m in claims, mostly for third party property damage.

This was such an extreme combination of circumstances, considered so unlikely by insurers, that they had offered unlimited cover at the time. The event led to insurers imposing a £20m third party property damage limit for all motor coverage for all insureds, even though the actual insured was not a local authority.

Increased Premiums

Extreme claims can push up premiums for a local authority even if there have been no "extreme" claims in the past for that authority. Insurers are ultimately in business to make a "risk-adjusted" profit; in other words, after meeting solvency requirements, the return on their shareholders' capital must be commensurate with the realistic risk that shareholders may lose some of their

capital in the event of an extreme claim - shareholders who provide capital to higher risk businesses expect higher returns, otherwise there is no incentive to invest their capital in the insurance sector, in which case insurance for extreme events could not be offered at all.

Ultimately, every class of business has the potential for an extreme claim – a combination of circumstances which results in a catastrophic loss; although such circumstances may be considered "unlikely" by the authority's risk manager, the fact that the circumstances are not impossible means that there is a risk that the insurers' shareholders will lose some of their capital in the "unlikely" event that these circumstances actually materialise.

The higher the frequency and severity of such an extreme loss, the higher return on capital is required by shareholders and the higher the solvency requirements (the "1 in 200 year" event) are required by the FSA (or Lloyd's). As worldwide extreme events get larger, more capital is required to meet solvency requirements, resulting in higher premiums. Insurance is becoming a riskier game, with each "extreme" event almost certainly being bigger than the previous event.

Extreme events keep on getting bigger. Insured values rise inexorably. Insurance and risk management of "extreme" risks is therefore more important

than ever.

EVT is here to stay. Though supported by mathematical argument for very large samples, EVT is still based on unverifiable assumptions - we cannot predict catastrophic events, but at least EVT can help us to estimate their impact and therefore plan risk management actions accordingly.

Local authorities must start "thinking the unthinkable". Multi-million pound claims for EL and PL (especially for children) have already occurred for some authorities; flood and storm damage events can easily reach tens of millions of pounds; the cost of a terrorism event could easily reach £100m for a single authority. As these events become more common, premiums will rise and less coverage will be offered, leaving authorities with difficult risk financing decisions.

Insurers are concerned about what the "realistic disaster scenarios" (e.g. maximum probable losses) will be for your authority for each class of business. What are you doing to prevent such large losses? What will you do in the event of such a loss to keep the costs down for the insurer?

Presenting this information in a structured way is the key to demonstrating good risk management to insurers and hence obtaining good insurance terms for "extreme" risks.