Catastrophe risk and the cost of real estate insurance policies

Any real estate company that owns property in states exposed to hurricanes or earthquakes is well aware that it can be very expensive to insure properties in areas subject to natural catastrophes. Florida, for example, has been pummeled by eight of the ten most costly hurricanes in US history, causing more than $60 billion in insured damage, according to the Insurance Information Institute. Catastrophe modeling firm RMS warns that a repeat of the 1906 San Francisco earthquake alone could produce as much as $80 billion in insured losses. These costs are factored into insurance premiums and are borne by policyholders.

Catastrophes include natural events such as earthquakes, hurricanes, tsunamis and tornadoes, as well as man-made disasters such as large-scale terrorist attacks. Property insurance pricing issues in the US largely have focused on the impact of hurricanes – which expose $9 trillion in coastal property values to loss, according to the Insurance Information Institute – and to a somewhat lesser degree on earthquake exposures.

Insuring property in catastrophe-exposed regions always will be expensive, but real estate companies need not be passive about their insurance costs. By understanding the factors that contribute to the price of insurance, they can take steps to lower their exposure to losses caused by natural catastrophes and to influence the factors contributing to the cost of property insurance.

The elements of property insurance pricing

The components of an insurance premium are similar for all types of insurance. Premiums consist of "expected loss" (or "loss cost") – the amount allotted to pay claims – plus various costs incurred by the insurer and an amount for the insurer's profit. For property insurance in catastrophe-exposed regions, three elements are of particular significance: (1) the catastrophe component of expected loss; (2) the cost of reinsurance; and (3) the cost of capital to absorb large natural catastrophe losses.

Expected loss

Fires are a common cause of property insurance claims. For buildings in many parts of the country, claims from fires account for much of the expected loss component of the premium. In regions that are prone to natural catastrophes, however, the fire portion of expected loss can be dwarfed by the amount for claims from hurricanes or earthquakes.

Calculating the catastrophe component of expected loss is far more challenging than calculating most other types of expected loss. For some types of insurance such as personal automobile insurance, a very large number of comparatively small claims over time make it relatively simple for actuaries to determine expected loss with precision. Much the same can be said for calculating the fire loss portion of expected loss for commercial property insurance. Natural catastrophes, on the other hand, occur far less frequently than do automobile accidents and building fires, and the losses caused by a single event can be in the tens of billions of dollars. Consequently, standard actuarial techniques, which rely on the law of large numbers, do not work well for estimating expected loss for policies exposed to hurricanes

and earthquakes. Rather, the expected loss component is calculated using complex computerized catastrophe models, which mathematically simulate large catastrophes and estimate the damage to properties in their path. Catastrophe models are discussed later in this report.

Of the elements that most influence property insurance premiums in catastrophe-exposed regions, real estate companies have the most control over expected loss. For example, properties that are clustered in an exposed area are more likely to have a higher total expected loss than a similar portfolio of properties spread over a broader geographic area. When acquiring properties, real estate companies should assess the impact of proposed acquisitions on the risk profile of the portfolio. Construction characteristics play a large role in how susceptible buildings are to damage. For hurricane-exposed buildings, features such as roof anchors, engineered shutters and how the roof sheathing is attached can have a big influence on how much damage is expected to be sustained in a large storm.

Catastrophe reinsurance

Among the costs factored into the price of insurance is the cost of reinsurance. When reinsurance costs rise, as they often do following a large catastrophe, the cost of insurance is likely to increase, as well.

Few insurance companies retain all the risk assumed under the policies they underwrite. Even the largest insurance companies find it necessary – or at least financially desirable – to transfer some portion of their risk to the reinsurance market. Reinsurance is a way for insurance companies to guarantee that worse-than-expected claims will not financially impair the company. A vitally important role of reinsurance is to absorb property insurance losses from large natural catastrophes.

For the most part, the net cost of reinsurance – the difference between the premiums insurance companies pay for protection and the losses they recover from reinsurers over time – is quite low relative to the total property insurance premium, and is largely unnoticed by policyholders. However, when reinsurance costs shoot up sharply following a large catastrophe, it can have a material impact on insurance premiums.

Individual real estate companies have little influence over the cost of reinsurance and its impact on their individual insurance premiums. However, they can make insurance buying decisions based in part on how much reinsurance an insurer needs to buy, and, consequently, how much influence reinsurance costs can have on property insurance premiums. In general, large globally diversified insurance companies have less need for reinsurance, and have more control over their reinsurance costs.

Volatility and risk capital

Another factor built into insurance pricing is the cost of capital regulators and rating agencies require insurers to set aside to pay claims in case losses are much worse than expected. Due to the fact that natural catastrophes can produce massive losses, insurers that write property business in catastrophe-exposed areas must hold a great deal of cash to cover potential claims. After 2005, when Hurricane Katrina, Hurricane Rita and Hurricane Wilma combined to produce record-shattering insured losses, the major rating agencies concluded they had not been requiring some insurers and reinsurers to hold enough capital. All the major agencies changed their capital adequacy models to reflect the perceived greater risk.

The amount of capital insurers are required to set aside varies by type of insurance, and is a function of the volatility of the losses for each insurance type. The more volatile the claims experience, the more capital is required. Because large natural catastrophes such as hurricanes and earthquakes represent one of the most volatile exposures written by insurers, the impact on property insurance pricing will necessarily be much greater in states like Florida, Mississippi and California than, for example, in Illinois, Minnesota or Nebraska, where the principal catastrophe exposures are far less severe tornadoes, hail storms and floods.

As was the case with reinsurance, real estate companies have little control over the charges embedded in their premiums for the capital insurers must hold to absorb potential volatility. However, also like reinsurance, real estate companies can make insurance buying decisions that minimize the impact of this factor on their insurance costs. Once again, it is larger, more globally diversified insurers that generally fare better. Smaller companies with heavy concentrations of properties in catastrophe-exposed areas typically are required to maintain proportionately more capital reserves to provide the necessary buffer.

Catastrophe models

Computerized models that estimate the impact of natural disasters on portfolios of properties play important roles in all three elements of catastrophe premiums discussed above: expected loss, reinsurance premiums and the cost of capital to absorb claims volatility. Understanding how these models work provides key insights into the property insurance pricing process. Additionally, real estate companies – especially those with large property portfolios – can themselves benefit from these models to assess the catastrophe exposure to their properties, to evaluate risk management options and to understand how to lower their expected loss.

All the major catastrophe modeling firms have models for both hurricane and earthquake risk in the US. Hurricane models mathematically simulate large numbers of storms of various intensities, and calculate the aggregate damage, in dollars, they would cause to properties in their paths. Key variables include concentrations of property values, how close properties are to shorelines and construction characteristics. Similar processes are used to model earthquakes and the damage they can cause.

The computerized catastrophe modeling industry took off like a rocket in the aftermath of Hurricane Andrew in 1992. Andrew landed a direct blow to Florida's Atlantic coast below Miami, causing $15.5 billion in insured losses and more than $25 billion in total economic losses. The blow dazed the insurance industry. Prior to Andrew, insurers generally concurred that a hurricane could result in insured losses of no more than about $8 billion. The $15.5 billion in insured loss from Hurricane Andrew was virtually incomprehensible, invalidating insurers' forecasting techniques and prompting an urgent reassessment of catastrophe risks.

Computerized catastrophe modeling was still in its infancy, but it held out the promise of a scientific, disciplined approach for pricing and managing catastrophe risk. One of the first catastrophe modeling firms was Applied Insurance Research, now known as AIR Worldwide, which was founded in 1987. After Hurricane Andrew, other firms followed in its footsteps. Catastrophe modelers initially focused on US hurricanes, but subsequently developed models for all types of catastrophes, including terrorism and pandemics, for regions throughout the world. Catastrophe models now are used by all major insurers and reinsurers for pricing and risk management purposes, as well as by regulators and rating agencies for assessing insurer financial strength.

Catastrophe modeling has been an evolving discipline. All the major catastrophe models badly underestimated the damage caused by Hurricane Katrina, which caused nearly $50 billion in insured losses in 2005, leading the modeling firms to yet again reconsider their assumptions about the amount of damage that can be caused by a hurricane. Subsequent analysis indicated that some issues were not specific to windstorms, but were more broadly applicable to "megacats," whether hurricanes, earthquakes or terrorist events. One modeling company, RMS, revised its models to better account for what it termed "loss amplification," a "cascade of far more damaging consequences" that can follow in the immediate wake of a major catastrophe. Other modeling companies made similar adjustments. As a result, catastrophe models now produce higher estimates of losses for some types of hurricanes, as well as for large earthquakes.

More recently, 2008's Hurricane Ike challenged the models when the storm, which made landfall in southern Texas, combined inland with another storm system and wreaked havoc as far north as Ohio. It is likely that future storms will force modelers to again reassess their assumptions, perhaps resulting in yet higher estimates of expected losses. The modeling process is further complicated by the fact that some climatologists believe we have entered an era of more frequent and more intensive storms. Though lacking a blockbuster event like Hurricane Katrina, 2008 was the third worst year on record for insured catastrophe losses, according to Swiss Re.

Catastrophe models also take into account the growing concentration of property values in areas highly vulnerable to catastrophes such as southern Florida and southern California. According to the Reinsurance Association of America, Gulf and Atlantic Coast insured property exposure totals $9 trillion. Of this insured coastal exposure, $2.4 trillion is in Florida, $2.4 trillion is in New York, $900 billion is in Texas, $775 billion is in Massachusetts, $635 billion is in New Jersey, $480 billion is in Connecticut, and $224 billion is in Louisiana. Catastrophe modeling firm AIR Worldwide estimates that catastrophe losses will double every decade due to this growing residential and commercial density. Higher damage estimates from growing concentrations of property values are likely to result in higher reinsurance costs over time, and may require larger commitments of capital as buffers against worse than expected losses. These are costs that will be passed on to policyholders.

Conclusions

After skyrocketing in 2006, property premiums in Florida and other catastrophe-prone areas began drifting downward, largely the result of a glut of capacity in the global insurance and reinsurance markets. However, thanks in large part to massive catastrophe losses in 2008, reinsurers are demanding rate increases for catastrophe reinsurance. This may presage a new period of rising insurance premiums in catastrophe-exposed regions. As average premiums rise, it becomes all the more critical that real estate companies understand the factors that contribute to cost of insurance, and to take steps to control their loss exposures and manage their insurance costs.

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