



1015 1/2 7<sup>th</sup> St. NW  
3<sup>rd</sup> Floor  
Washington, DC 20001  
202.525.5717  
admin@rstreet.org

*Free Markets. Real Solutions.*  
[www.rstreet.org](http://www.rstreet.org)

---

## **Earthquakes and mortgage risk**

By Ian Adams

October 2014

### **Executive Summary**

The United States faces severe earthquake risk in many areas of the country, yet consumers routinely choose not to purchase insurance products to cover this risk. Low earthquake insurance take-up rates create a scenario in which a major event could result in significant mortgage defaults. The problem is real and serious, although understanding its precise magnitude will require more research. However, there is ample reason to believe the insurance and reinsurance markets are sufficiently well-capitalized to address the issue. Confronting the risk of mortgage default will require changes to product offerings, mitigation efforts and mortgage-loan underwriting standards.

### **The threat**

To understand earthquake risk, catastrophe modelers fashion scenarios that account for the severity and frequency of the hazard, local vulnerabilities and insurance exposure.

*Hazard:* Earthquakes are hard to model because they are infrequent and can happen almost anywhere. In the United States,

major risk areas include Charleston, S.C.; southeastern Missouri; portions of Tennessee; Alaska; Nevada; and the Pacific Coast, including California. The expected timescales between earthquakes vary from place-to-place. Over a sufficiently long scale, earthquakes are inevitable along any major fault.

*Vulnerability:* Though the primary damage caused by an earthquake is related to ground shake, secondary hazards such as tsunami, fire and sprinkler-related water damages are important to account, as well.

*Insurance exposure:* Some structures are more susceptible to damage from ground movement than others. For this reason, risk modelers account for building standards, construction types, occupancy, year built and number of stories when evaluating exposure to earthquake risk.

Applied to specific historical scenarios, models that account for the preceding criteria provide a sense of how expensive earthquakes have become. For instance, if a 7.0 magnitude earthquake, similar to one experience in 1868, were to occur near the Hayward Fault today, the total economic loss would approach \$180 billion, while insured losses would be only \$20 billion. Hurricane Katrina, by comparison, did \$108 billion in economic damage.

## Risks to taxpayers

Taxpayers bear a significant portion of the risk from earthquakes. In California, the current earthquake policy take-up rate is only 10 percent, even though roughly 80 percent of the state's homeowners live in areas with significant earthquake exposure. This means that taxpayers will almost certainly have to pay the bills, one way or another, following an earthquake. They'll do it either by writing checks to homeowners or by bailing out government-backed mortgage-related entities

Taxpayers might have to pay directly. While this has not been typical, Congress made an exception following Hurricane Katrina, when it appropriated money to the State of Louisiana to help compensate homeowners who did not have insurance. This type of government-induced moral hazard creates a disincentive for individuals to finance their own risk transfers. It is empirically verifiable that every \$1 of federal disaster aid forestalls \$6 of investment in private insurance coverage.

Even if taxpayers don't pay the bills directly, they still may be on the hook. In most of Northern California, taxpayers back almost all mortgages under \$625,000 through Fannie Mae, Freddie Mac, the Federal Housing Administration and the Veterans Administration. Previously considered quasi-private "government-sponsored enterprises," Fannie and Freddie have been under the conservatorship of the Federal Housing Finance Agency since September

2008, during which period taxpayers have contributed \$187.5 billion to bailing out the GSEs. Given the chances that an earthquake could seriously damage thousands of homes uninsured for that peril, there's a good chance that future support would be needed.

Problems with the structure of the mortgage-securitization system, similar to those that caused the 2007-2008 financial crisis, mean that price signals may not alert market players to the danger. Once bundled and sold in securities by Fannie, Freddie and private parties, mortgages are not "tagged" as earthquake prone. Further, banking regulators, while interested, do not have data about the likely impact of massive mortgage defaults on uninsured properties following a catastrophic earthquake. As a result, default risk on those mortgages is not fully reflected in the securities' basis risk.

In short, taxpayers may end up on the hook following a major earthquake, even if Congress never appropriates emergency funds to help uninsured property owners.

## Can the private market do it?

The private market is well-capitalized for earthquake risk. Many reinsurers have begun repurchasing their own shares because they have more capital than ways to profitably deploy it.

At the moment, there is \$570 billion in global reinsurance capital; another \$60 billion of capital in the catastrophe-bond market; and, among traditional insurers, \$4.2 trillion in capital. That sum, an impressive

\$5-6 trillion, likely undervalues the amount of capital available should pension funds and high-net-worth individuals choose to engage their resources. The market can easily cover earthquake.

Currently, most of the catastrophe insurance market is focused on Atlantic hurricane risk. If the California market were to expand, catastrophe risk would be diversified in such a way that lower premiums could be offered in both hurricane-prone areas like Florida and in California.

### **Protecting taxpayers by increasing take-up and mitigating risk**

The recent experience in Chile shows how a country much poorer than the United States can survive an earthquake and have plenty of resources to rebuild. Following an 8.8-magnitude earthquake (the sixth-strongest ever recorded), the South American nation sustained losses equal to 20 percent of its GDP. (The equivalent of a \$3.36 trillion event in the United States) In Chile, however, 96 percent of homes with a mortgage maintained private earthquake coverage. Recovery was able to commence almost immediately, because of the quick influx of insurance capital. The United States needs to develop similar insurance take-up rates and to mitigate earthquake risk proactively. Several steps are in order:

*Better products:* Most Californians do not purchase earthquake insurance. In part, this is the result of a paucity of attractive insurance options. The California Earthquake Authority, the publicly run and

privately financed agency that writes most coverage in California, concentrates its offerings in policies with very high deductibles. These are relatively unattractive, because they provide little coverage for the types of minor quakes that are most likely to befall homeowners. Worse, in the event of a serious event, these policies create a moral hazard. For instance, since earthquake insurance must include coverage for fire following a quake, a homeowner might be inclined to ignite a blaze to ensure they collect.

*Better education:* Despite the CEA's educational efforts, most consumers remain unaware of the risk they face. Research is needed to gain a better understanding of the causes of consumer ignorance, the public perception of earthquake risk and how these factors impact purchase decisions. The perspectives of primary insurers, who interact directly with consumers, could prove particularly instructive.

Until a holistic understanding is achieved, prices—as reflected by rates for insurance coverage or for mortgage interest—can help consumers understand the risks they face.

To ease the way to better consumer understanding, semantic ambiguity must be reduced. By describing an event's likelihood as "1 in 1,000 years"—as many in the media and insurance industry do—consumers are left to think of the risk not in terms of its severity, but rather its low probability.

*Better incentives to insure and mitigate:* Mortgage loans typically require borrowers

to secure multi-peril homeowners' insurance policies, as well as flood insurance if the property is in an area with significant flood risk. The GSEs, which dominate the mortgage market, do not require earthquake insurance. Mortgages are an effective tool for nudging homeowners to purchase insurance. A "nudge" to purchase insurance when taxpayers are involved with backing a mortgage would serve the nation well.

A variety of structural and non-structural mitigation measures can help save lives, ameliorate injuries and reduce property damage in the event of an earthquake. Structural improvements include seismic retrofits to foundations, wall systems, roof systems, chimneys, garages, room additions and skylights, and may differ depending on whether the home is wood frame or masonry. In addition, there are inexpensive and easy ways to protect against the interior damage that earthquakes can cause from falling items such as water heaters and large appliances, light fixtures, wall-mounted televisions and pictures, and shelf items. Technical guidance on all of these is freely available.

Public and private monetary incentives can help motivate action. On the private side, providing deeper premium discounts on a wider array of properties and for claims saving measures could simultaneously increase take-up rates. On the public side, legislatively achieving mitigation financing flexibility could free-up property owners to amortize the cost of mitigation.

## Conclusion

Uninsured and under-insured earthquake peril presents a severe risk to taxpayers that current systems do not do a good job confronting. There is ample reinsurance capital to confront the problem. Now, America needs insurance product innovation, proper mitigation incentives, and political will.

*Ian Adams is California director and a senior fellow for the R Street Institute.*