

The Nature of Risk

By Katie Dobbyn and Mark Fleming

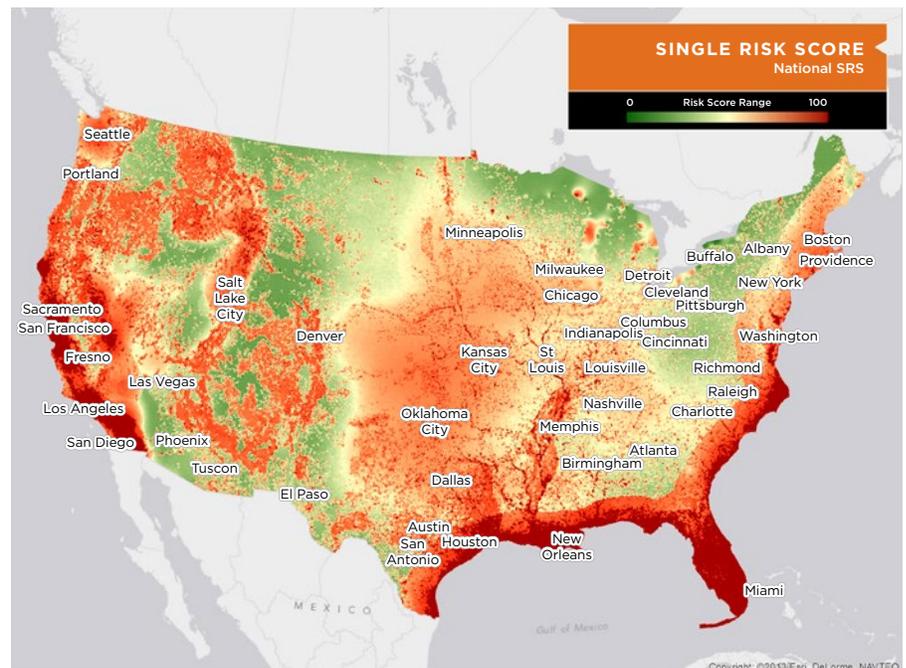
IN THIS ARTICLE:

- ◆ Mortgage portfolio exposure to natural disaster risk is traditionally not quantified.
- ◆ Mortgage default risk, after controlling for traditional credit characteristics, is influenced by natural hazard risk.
- ◆ The greatest exposure to mortgage default risk due to natural hazards is in Miami, Florida.

There are many ways that mortgage risk can manifest itself: prepayment risk, credit default risk, fraud risk and collateral risk to name just a few. The mortgage finance industry has a long history of expertise in measuring many of these risks. However, there is one risk that traditionally has not been directly managed, but rather insured against by the borrower—natural hazard risk. Flood insurance is required when a property resides in a flood zone and standard homeowner’s hazard insurance covering a variety of additional natural hazards is also typically required. Today, can we say with certainty what a portfolio’s natural hazard risk exposure is? That is to say the extent to which there could be defaults caused by a natural disaster? If another Sandy happened, what would the increased propensity of defaults be?

The truth is, we know very little systematically about the level to which mortgage portfolios are exposed to natural hazard risk. In this article, CoreLogic economists test the hypothesis that natural hazard risks, after controlling for traditional mortgage risk characteristics, increase the propensity of mortgage default, and then translate the level of risk of natural hazard default into loan-to-value (LTV) risk space. Utilizing an inherent

FIGURE 1. THE RISK OF LIVING ALONG THE COASTS



Source: CoreLogic

understanding of, all else equal, the different risk profiles of an 80 LTV loan versus a 95 LTV or 125 LTV loan, the propensity to default caused by natural hazards can be represented in terms of the amount one would need to adjust the LTV to account for this risk.

A Single Universal Measure of Natural Hazard Risk

To understand the likelihood of default due to natural hazards requires a good

measure of natural hazards in the first place. CoreLogic developed a natural hazard single risk score, representing the total natural hazard risk at a particular geographic location from all potential natural hazards combined. These hazards include tornado, hurricane and straight-line winds, hail, wild fires, earthquakes, storm-surge flooding, inland flooding and sink holes. Each natural hazard risk is modeled individually based on the geospatial

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characteristics that are predictive of that risk. For example, storm surges are modeled as a function of atmospheric pressure, hurricane track, hurricane speed, tides, bathymetric shoaling, elevation, land-based barriers and historical and modeled storm tracks. The natural hazard single risk score is then created as a weighted combination of the individual natural hazard risks accounting for the severity-weighted likelihood of the individual natural hazards at the particular location (Figure 1). This single risk score provides us with a comprehensive and national view of where natural hazard risk resides and the extent of its severity.

The Risk to Mortgage Default Due to Natural Hazards

To test the hypothesis that, after controlling for traditional mortgage risk characteristics, the propensity for natural hazard risk at the property level increases mortgage default risk, CoreLogic economists constructed an illustrative model that predicts the probability of default as a function of traditional borrower, loan and property characteristics typically used in the

“The propensity to default because of natural disaster of a high natural disaster risk loan is almost double that of the propensity for a low risk loan.”

mortgage industry. Borrower credit worthiness, ability to pay, equity level and loan purpose are all included to predict the likelihood of serious delinquency, foreclosure or REO. If the property-level propensity for natural hazard risk doesn't increase mortgage default, then the natural hazard single risk score should have no bearing on mortgage default risk. The borrower who experiences a natural disaster would rebuild or repair and continue to make the mortgage payments. Alternatively, if the natural hazard single risk score does help explain mortgage defaults, then some borrowers will default, all else equal, on the mortgage in the event of a natural disaster. In this model framework, the natural hazard single risk score is added to the model to test the hypothesis of natural hazard risk property level propensity to default. If the single risk score is found to be an insignificant characteristic in the model, then natural hazard risk doesn't influence

mortgage default. If the single risk score is found to be significant, then it can be concluded that some borrowers do default because of natural hazard events instead of rebuilding or repairing.

The data used to estimate the model was a 1.5 million record sample of first lien loans that were active between January 1995 and June 2013 randomly selected from a broader universe of prime, subprime and Alt-A loans with monthly payment history. The probability of default model was estimated on this data using a logistic regression technique.⁴

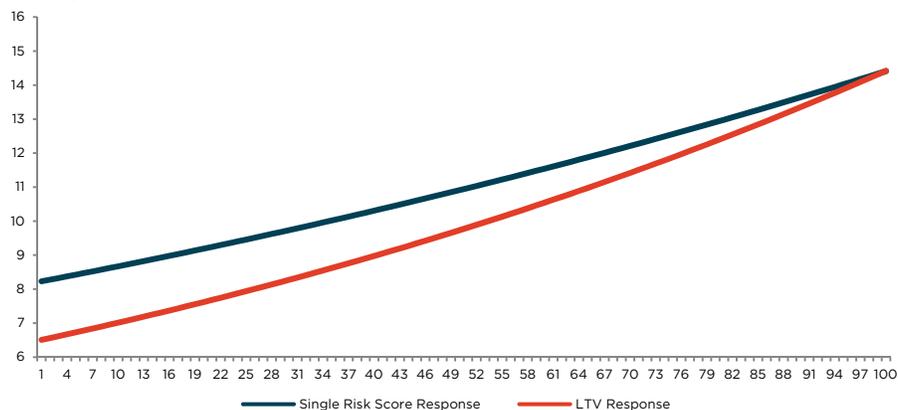
Defaulting Due To Natural Disasters

The probability of default model indicates that the natural hazard risk score is a statistically significant predictor of default. The influence of the natural hazard single risk score and LTV are both shown in Figure 2. The propensity to default because of natural disaster of a high natural disaster risk loan is almost double that of the propensity for a low risk loan. By comparison, the propensity to default because of lack of equity, as measured by origination LTV, of a high LTV loan is a little over double that of the propensity for a low risk loan.

Another way of articulating the default risk implied by the natural hazard single risk score is to translate the amount of increased default propensity that the natural hazard single risk score represents in the model into LTV default risk, a natural hazard adjusted LTV. In other words, how much would LTV have to be adjusted in order to account for the default risk caused by the natural hazard risk implied by the single risk

FIGURE 2. TO BE UNDER OR NON-INSURED

Probability of Default (Basis Points)



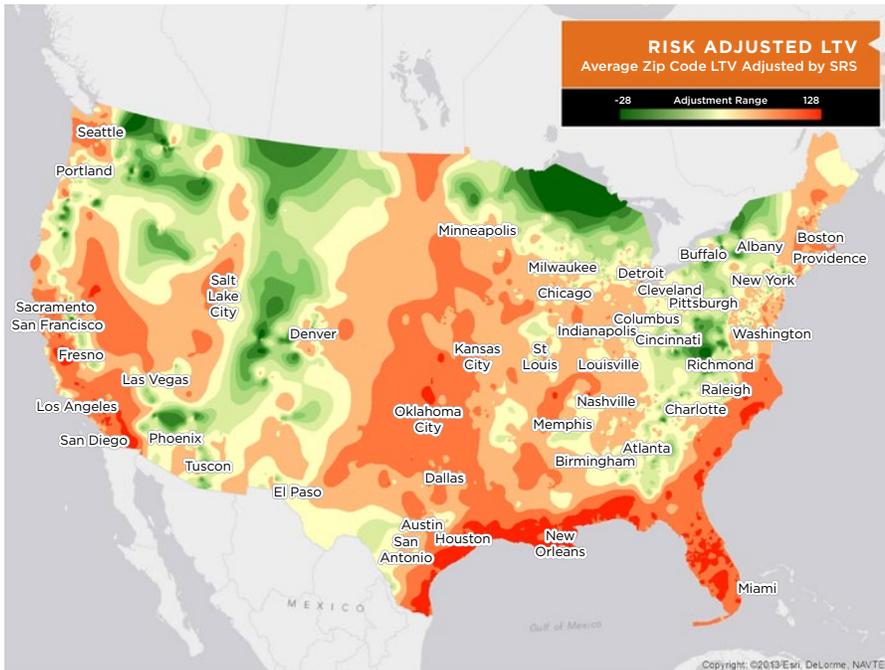
Source: CoreLogic

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Footnote

⁴ For more on logistic regression and discrete choice models more broadly see Maddala, G.S. (1986) Limited-Dependent and Qualitative Variables in Econometrics. Cambridge: Cambridge University Press.

FIGURE 3. THE HAZARDS OF LIVING ON THE COASTS



Source: CoreLogic

score? The higher the natural hazard single risk score, the more the LTV has to be adjusted to account for the risk. In Figure 3, the natural hazard risk adjusted LTV is mapped across the United States. Conforming to the highest natural hazard risk existing along the coasts of the United States,

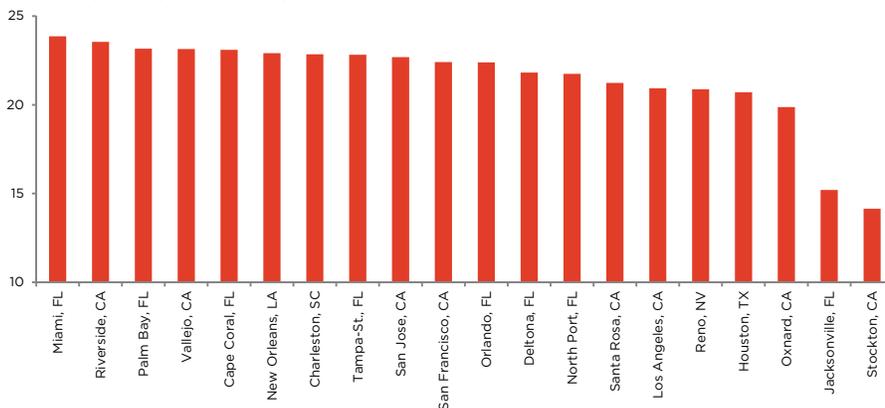
the risk adjusted LTV is highest in the western coastal markets and along the Gulf and southern Atlantic coasts.

Delving down to the market level, the highest natural hazard adjusted LTV markets are shown in Figure 4 for the top 20 markets. The amount of adjustment required to account for

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FIGURE 4. THE LEAST SUFFICIENTLY INSURED MARKETS

Market Average LTV Adjustment Necessary to Protect Against Natural Hazard Default Risk



Source: CoreLogic June 2013

In the News

Businessweek, August 8

Serious US Mortgage Delinquencies Decline to Lowest Since 2008

The share of U.S. homeowners who owe more than their properties are worth fell to less than 20 percent in the first quarter as values surged in hard-hit markets, according to CoreLogic Inc.

Realtor Magazine, August 7

CoreLogic: Rapid Rise in Home Prices 'Remarkable'

During the first six months of this year, home prices jumped 10 percent, the fastest pace in 36 years, CoreLogic reports.

Reuters, August 6

Home prices jump in June as sector recovers: CoreLogic

Home prices jumped in June and are forecast to ramp up further in the latest signs of a housing market that is on the mend, data from CoreLogic showed on Tuesday.

USA TODAY, August 6

Home prices rise again, but at a slower pace

Market researcher CoreLogic says June home sales prices were up 11.9% year-over-year and up 1.9% from May. But that's a slower month-to-month rise than 2.6% in May from April and the almost 2.8% increase in April from March, revised figures show.

Inman.com, August 6

Home prices trending at fastest upward pace since 1977

In July, prices are expected to increase 1.8 percent from June, and 12.5 percent on an annual basis, according to the CoreLogic Pending Home Price Index, the data aggregator's forward-looking price index.

CBS News, August 6

Obama to pitch plan to help home buyers; new figures show housing market...

A survey by the property information firm CoreLogic finds home prices in June were nearly 12 percent higher compared to the same time last year.

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the high amounts of natural hazard risk in these markets is shown. Miami is the riskiest, but almost all of the markets in the top 20 are in either Florida or California.

A Risk To Be Improved Upon

Through the recent crisis in the housing and mortgage finance markets, the

industry has learned a lot about how to better manage and predict risk. The cost of not doing so is far too high. One risk that we have historically presumed is covered by requiring insurance is the risk of mortgage default due to natural disasters. Our research demonstrates that borrowers, after controlling for their propensity to default based on traditional mortgage credit characteristics, default

at a higher rate the higher the propensity of natural disaster is at the property level. This may be because they are either under or un-insured against the natural hazards to which the property is exposed. The nature of risk is that work needed to successfully manage it is never finished. Natural hazard risk is another new frontier of risk management requiring ongoing attention.

End.
