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## Using Monte Carlo Simulations to Establish a New House Price Stress Test

By **James R. Follain** and **Seth H. Giertz**

**ABSTRACT:** The focus of this paper is on the house-price stress test that was designed to assess the fiscal strength of the government-sponsored mortgage securitizers Fannie Mae and Freddie Mac. The stress test is meant to serve as an alert — and to trigger remedial action in order to avert a financial crisis.

Prior to the current house price bubble and bust, the standard stress test for Freddie and Fannie was built upon the housing market crash of the early and mid-1980s in Arkansas, Louisiana, Mississippi and Oklahoma — and named ALMO, after those states. Follain and Giertz found that, when compared to an updated statistical process that uses all state data thru the mid-2000s, the ALMO stress test severely understated the weakness of the housing market leading up to the Great Recession.

If stress testing of Fannie Mae's and Freddie Mac's holdings had been updated and applied in real rather than nominal terms, the authors write, "perhaps additional capital would have been held and the consequences of the Great Recession would have been less onerous."

The paper details the authors' process in assessing whether the ALMO stress test was an adequate

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representation of an extremely weak housing market, given the best available information leading up to the Great Recession of 2007-2009. They developed a Monte Carlo simulation model to estimate the severity of low-probability events (in this case, severe house-price declines). They illustrate the complexity and subjective nature of the process used to generate plausible house-price stress-test scenarios, in which there would be clear, sustained declines in house prices.

*Their full article is published in the Journal of Housing Economics.*

They conclude that the ALMO stress-test scenario understated possibly by 50 percent or more what an updated statistical process would have suggested. This understatement stems in part from idiosyncrasies related to the creation and implementation of ALMO. Other factors contributing to the miscalculation include a fundamental shift in the relationship between housing price appreciation and key explanatory variables — especially over the past 10-15 years.

The authors offer several suggestions for a new stress test that include continual updates and testing, as well as variation across markets. And, like the recent Federal Reserve Board stress test, the scenario should be based on real (rather than nominal) price patterns, they write.

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