

## *Linking Domino Theories to Real-World Pricing*

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INFORMATION

**M**any blame structured financial instruments, such as credit default swaps and collateralized debt obligations, for the 2008 recession. Yet similar products traded for decades without problems. Even now, billions of dollars in structured debt trade daily. Steven Kou has made it his mission to make these products safer.

"As an engineer, I'm interested in linking economic theory to real-world pricing of structured financial products," said Kou. "Economists understand the structure of economic forces, and statisticians understand how one event triggers another, like the aftershocks of an earthquake. We're trying to apply both to the details of financial products."

Structured instruments reduce risk, he said. He points to instruments that pool corporate bonds. Instead of buying a bond from one company, investors can buy a diverse portfolio of bonds from companies in different industries.

Financial firms typically divide this basket of bonds into risk categories, or tranches. The top tranche has the lowest risk but the lowest returns. It loses money only if 30 percent of the bonds default. This is highly unlikely, and it trades like a highly rated bond. The bottom tranche has the highest return but loses money if only a smaller percentage of bonds default.

"There's a value to this," Kou explained. "Pension funds, for example, cannot invest in bonds rated less than AAA. Many strong companies have lower credit ratings. If their bonds are included in the top tranche, a pension fund can buy them without great risk and still receive a higher return."

Many investors were lured by that combination of higher returns and lower risk. They believed that even if conditions in one industry forced a company to default, diversification would keep their investments safe.

In 2008, though, that assumption was upended. "The model we had been using was no good. During a severe crisis, we found that when one company defaults, others outside its industry are more likely to default," Kou said.

Kou calls this "default clustering." To understand how it affects risk and value, he builds models that draw on both economics and financial engineering.

Kou said the models will help set more realistic prices for structured financial instruments. Initial results are promising. Just before Lehman Brothers went bankrupt, conventional models set the cost of insuring the top tranche of corporate bonds at about \$7,000. His model priced it at around \$52,000.

"That's more consistent with what happened in the market," he said.

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