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Using predictive data analysis to value loan portfolios

The key to mitigating risk in both the primary and secondary markets is being able to forecast which loans are likely to perform well and which are likely to prepay or default.

In an exclusive interview with *Real Estate Technology Insight,* **Glenn Schultz**, director of prepayment modeling and analytics and head of residential ABS research at Banc One Capital Markets, told us how he applies predictive analysis to loan pools using loan-level data.

How do you use modeling techniques to value loan portfolios?

Schultz: At Banc One Capital Markets, we use modeling techniques on a number of different levels. One is to consult our issuer clients that originate securitized nonprime mortgages. They are interested in how sources of loans—brokers—perform differently. Our issuer clients want to know if a group of brokers produces significantly different prepayment rates, whether voluntary or involuntary, so that they can make assessments as to whether the brokers are actually performing as promised with respect to the loan they are sourcing back to the originator.

We use models on the capital markets side for external clients engaged in securitization. We deploy these models back to our clients for valuing loans they are considering purchasing. We also re-deploy the models back to our clients for the purposes of valuing their servicing income. In the event of securitization, our clients can use model projections for expected future prepayment rates to value the residual—the piece that is left over after securitization.

As an originator or purchaser of loans, you pay a premium for a loan. If you paid $103 for every dollar of loan you purchased, and the borrower prepaid tomorrow, you would only get $100 back, which would amount to a $3 loss. The way most companies make money is through the servicing of the loan. Companies have to collect servicing income for a certain amount of time before the loan becomes a break-even proposition. And, they have to collect servicing income beyond that point for it to become profitable.

When paying premiums for loan packages, the least desirable outcome is prepayment. The worst outcome is the broker soliciting the borrower to refinance rather than the borrower deciding on his own. We do modeling to determine the forces contributing to prepayment rates.

The results of this analysis can be implemented across the mortgage lending value chain from loan origination and risk-based pricing to term securitization. For example, once we are able to identify the loan and borrower characteristics that result in a lower probability of prepayment or default, we can tailor our loan products accordingly. And, for securitization, the correct modeling of voluntary prepayments allows for more efficient pricing of term execution.

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What data do you need to do this type of analysis?

Schultz: We use loan-level data and transaction history. By that, I mean we use the unique characteristics of each loan—including borrower characteristics provided to us and information collected at the time of underwriting—to create a month-by-month performance history of the loan.

We currently have about 2.5 million subprime loans, and we maintain transaction history on all of them. Those loans are on average of three to four years old. And, 36 to 48 months on 2.5 million loans turns into a substantial set of data very quickly. We are able to analyze those large data sets using Insightful Corporation's S-PLUS and Insightful Minor products.

(Editor's note: Insightful Corporation is a provider of software for data analysis headquartered in Seattle, Wash. The company's S-PLUS product conducts exploratory data analysis and statistical modeling. Insightful Miner is a data mining and predictive analysis application. Both are designed to assist in business decisionmaking.)

Why did you choose those particular products?

Schultz: A typical model, designed to predict voluntary prepayments, analyzes data such as borrower turnover, seasonal factors, economic incentive to refinance and burnout.

On the other hand, a loan-level prepayment model is better able to capture the influence of borrower and loan characteristic cohorts on the borrower turnover component and the response to an economic incentive to refinance.

There were several reasons BOCM favored a loan-level approach. First, investors required greater information regarding the loan-level drivers influencing mortgage prepayment rates and how the company's management, underwriting practices, and servicing combine to create unique cash-flow characteristics. Second, industry consolidation led the dominate market participants to seek competitive advantages such as product differentiation.

We model the forces that create prepayment risk, and we decided to use S-PLUS and Insightful Miner because of their scalability. We have been using S-PLUS since 2000, and we just took delivery of Insightful Miner in March of 2003. There wasn't a big learning curve required to reprogram all of our models. We originally chose S-PLUS because the way it handled the residuals for that type of analysis was superior to most products in which residual analysis was involved. It's a product better suited to that type of analysis.

Are you using this modeling technique in other areas? If so, where?

Schultz: We are extending these models into multiple events and using them to create a new model for determining the probability of delinquency and default. We had modeled default rates before, but we haven't yet modeled using a state-to-state factor of default. We're trying to get at the delinquency rates behind those default probabilities.

This is an issue that is becoming more important for institutions that originate and securitize loans. During a time in which mortgage rates are at extreme lows, getting a handle on prepayment and default rates is important. When rates go up, that will influence how different cohorts of loans are going to prepay.
The point of modeling is to better understand risk in terms of voluntary and involuntary prepayments. The other purpose is to use the results of the modeling to create loan products that mitigate risk.