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Risk-Based Pricing Systems For Alt-A And Subprime Mortgage Loans

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The use of excess spread and overcollateralization as credit enhancement has long been a staple in the subprime residential mortgage-backed securities (RMBS) marketplace. This methodology has become increasingly attractive in other RMBS collateral types, especially Alt-A mortgages. According to analysts at Standard & Poor's Ratings Services and Inside Mortgage Finance, approximately 70% of the \$1.15 trillion 2006 non-agency RMBS issuance used the senior-subordinate, O/C structure.

The additional modeling required to understand and take advantage of the O/C structure has hastened technology upgrades across the securitization and mortgage industries. Current market dynamics are also forcing vendors to produce models that can be integrated and work seamlessly together to provide reliable loan-level valuation and risk based pricing.

What is risk-based pricing? Essentially, it's the determination of an optimal interest rate or dollar price on a to-be-originated mortgage loan based on its estimated credit risk. The pricing assumes that all newly originated mortgages will be funded in the capital markets through securitization and that the credit enhancement of the securitization is derived from a senior-subordinate cash flow structure. The estimated credit risk of a mortgage, which is measured in terms of its ultimate loss, is typically analyzed using rating agency credit models, such as the Standard & Poor's LEVELS® model. Given the estimated loss, the models suggest the appropriate senior/subordinate credit enhancement levels for a contemplated transaction.

The Expansion Of O/C Structures Through RMBS

The growth of O/C structures is a direct result of the enhanced execution possible through the use of excess spread as credit support. The O/C structure requires originators to pledge excess interest and to create over-collateralization, which is used as a form of credit enhancement equal to the amount necessary to achieve the requested ratings according to rating agency requirements. For example, \$1 billion in collateral may be used in a securitization to collateralize the issuance of \$950 million of bonds—in other



words, a 5% O/C. The weighted average coupon (WAC) of the underlying collateral typically exceeds the required bond coupons (either fixed coupons or floating coupons fixed with amortizing swaps), producing the excess interest necessary to absorb losses and replenish or build O/C, typically by accelerating principal payments to the most senior bonds. The challenge to risk-based pricing strategies is to properly incorporate the nuances of valuation and execution decisions into the front-end pricing matrixes.

Determining The Capital Structure

The value placed on excess spread for use as credit enhancement is key to determining which credit enhancement structure to use for a securitization. In most cases, when excess interest is available, using that excess interest as credit enhancement generates a more economical securitization structure. The challenge is how to properly value the excess interest and understand how it will affect the capital structure. Although the standard senior-subordinate or “six pack” structure will provide for the sale of all or nearly all of the collateral, the senior (‘AAA’ rated) coupons of an O/C structure might represent a larger share of the issuance than the six pack structure. This will avoid the placement of collateral in several lower-credit-grade tranches such as ‘BB’ or ‘B’ because, generally, there is sufficient excess interest to cover (protect) up to an investment-grade level of losses.

Risk Management And Valuation Can Be More Difficult For O/C Structures

While the use of excess spread as credit enhancement has often been a boon for originators, it isn’t without its challenges when it comes to risk management and valuation. The variables and assumptions increase dramatically in the cash flow modeling process and they are often moving targets. Default timelines, interest rate stresses, and prepayment assumptions make up just part of the criteria used to model cash flows when valuing excess spread. Incomplete credit enhancement profiles are a valuation challenge for whole-loan traders, issuers, and originators, and O/C structures also introduce interesting duration and convexity implications for risk managers.

Additional Steps For Modeling O/C Structures

The additional analysis required in order to model O/C structures can be a time-consuming, labor-intensive process. To value a loan portfolio, industry participants must:

- Clean the loan data and ensure that there is sufficient data for the desired credit rating agency and cash flow models;
- Map the loan data to the model’s field values;
- Use the rating agency credit models to derive the credit enhancement requirements;

- Define the appropriate securitization structure;
- Define the appropriate prepayment, default, loss severity, prepayment penalty models, and other settings; and then
- Derive valuation by generating cash flows for the securitization structure using cash flow models calibrated to established rating agency requirements (such as Standard & Poor's SPIRE™ cash flow model).

Depending on the situation, one of these steps may be more complex than the others. For instance, if a recurring loan file format is used, data need only be mapped the first time. This contrasts with whole-loan traders who receive multiple loan file formats that often change unpredictably over time. Because many loan sellers work in Microsoft Excel, loan files are often generated ad hoc, resulting in changing values and missing data. Often, analysts must fix the initial data maps they receive, plus complete additional mapping on variables before sending the data to rating agency and cash flow models, both of which require specific data maps.

The Need For Improved Analytics

If whole-loan traders and originators had their way, this time-consuming process would be loan-level and automated from file receipt to valuation. Instead, most market participants today use separate stand-alone credit rating model interfaces and cash flow engines that not only need manual processing of each piece of the process but also require additional data integration in order to pass data between disparate models. Rather than supporting loan-level feeds, some models may require some amount of aggregation or reporting lines (“replines”) to work in their models. When providing loan-level granularity in both modeling and actual valuation, that aggregation may further complicate how data is passed to the model and how the model’s results are received. In short, the valuation process is time-consuming and clunky, and not particularly granular.

This is what risk managers are up against as they try to derive collateral valuation sensitivity to interest rate and credit spread moves. Fundamentally, different collateral types will have different prepayment, default, and severity behaviors. In addition, loan-level characteristics for each collateral type will require different credit enhancement requirements. Those behavioral differences will lead to different valuation sensitivities. To model rate sensitivity (duration) and the change in that sensitivity (convexity), risk managers need to derive valuations given different rate scenarios.

The modeling may entail taking the same credit enhancement profile and employing the cash flow model repetitively to generate valuation curves that can provide duration and



convexity. Given common tools and processes, that task can take a long time and often results in deal-level results instead of loan-level or even repline results. A further complication arises when incorporating how interest rates will affect excess interest availability, which in turn affects optimization of O/C and the resulting credit enhancement profiles. With those changes, the cash flow and the credit enhancement models have to be reprocessed for each scenario—also a formidable, time-consuming proposition with limited granularity.

Why Granularity Is So Important

Relative-value buyers are always trying to find ways to use more granular assumptions, and risk managers want to better model duration and convexity. If the data analysis isn't granular, risk managers are left without the means to efficiently engineer the credit enhancement from changing rates, and they won't be able to model convexity correctly. And without such a solution, investors cannot tie their own research and opinions to credit rating agency models to correctly model and predict loan performance.

To make loan-level analysis and process automation and integration a reality, credit and cash flow models must have program/software interfaces that other applications can call through code by passing loan data to the model and consuming the model results seamlessly. These automatic program interfaces (APIs) can then be called sequentially at the loan level, thereby providing loan-level valuations. By tacking rate scenarios to the front of the sequence risk managers may complete multiple calls per loan to derive duration and convexity.

In the current whole-loan environment, loan originators greatly benefit from the economic certainty offered by fast, accurate, loan-level risk-based pricing models. Portfolio and/or bulk valuations are often delayed because of the time-consuming, labor-intensive valuation process. Bids on bulks are often returned in 24 hours, not one or two. In addition, the labor-intensive review does not guarantee improved performance predictions or better bids for product. Those originators who integrate their credit rating agency and cash flow models through the use of APIs, however, will be able to offer more timely bids, as well as save on resources because of the decreased manual procedures. More important than reallocated resources, however, is the relative value that improved analytics offers investors. Central to this opportunity is the need to have sufficient model granularity, from prepayment and default through credit enhancement, to appropriately consider all loan-level feature effects. For this to happen, investors must look to API model integration and loan-level granularity in their models.



How To Gain The Competitive Edge

It's important for originators, traders, and investors to consider systems that both allow users to determine the impact that changes in loan characteristics will have on the ultimate securitization economics and allow more effective risk-based pricing and loan-level economic value analysis. Those seeking more automated, fast, and accurate valuation and risk-management analysis need to use information provided by rating agency APIs (and the systems/solutions that wrap those APIs together) along with loan-level granularity. Those that adopt this technology will be a step ahead of the rest.