

Market Intellect

from Standard & Poor's

Market, Credit and Risk Strategies

Valuing Structured Finance Assets 101: What Are These Things Really Worth?

Cutting Through The Rhetoric Surrounding The Valuation Of Complex Securities By Focusing On Their Cash Flows, Credit Risk, And "Risk Of Ruin"

"The difference between carrying a midtier RMBS on the balance sheet at 80 cents on the dollar and less than 10 cents on the dollar can be as little as a 5% difference in assumptions over future default rates." —Market, Credit, and Risk Strategies team

Michael G. Thompson
Managing Director
Market, Credit and Risk Strategies
1-212-438-3480
michael_thompson@standardandpoors.com

Robert Keiser
Senior Director
Market, Credit and Risk Strategies
1-212-438-3540
robert_keiser@standardandpoors.com

Jaseem Hasib
Director
Market, Credit and Risk Strategies
1-212-438-1158
jaseem_hasib@standardandpoors.com

The Market, Credit, and Risk Strategies group (MCRS) is a newly formed, separate and independent research team at Standard & Poor's. The objective of this group is to provide unique financial intelligence by analyzing relationships across multiple asset classes and markets. Enabled with cutting-edge S&P and third-party applications and data, the group offers investors valuable new sources for alpha discovery and "out-of-the-box" thinking through robust data exploration and analysis. The research is delivered through the Market Intellect series that provides investors with actionable and topical market perspectives that can offer innovative ways to leverage credit and risk intelligence.

Observations

A central challenge currently facing global investors is the appropriate and fully disclosed pricing of, and the risks associated with, Level 3 assets, also known as "mark-to-model" assets. This topic has been at the heart of the global credit contagion that has been roiling markets since July 2007. The Market, Credit, and Risk Strategies (MCRS) team believes these assets can be valued in a meaningful and transparent manner that is largely dependent on investors' perceptions of current and future credit risks. To show how this can be done, we conducted a case study that sheds light on the difficult and complex, but not insurmountable, nature of valuing esoteric structured finance Level 3 assets.

Key Findings

- Not all RMBS tranches are created (i.e., structured) equally. While some deserve serious consideration by even the most risk-averse money managers, others should be avoided by all but the most sophisticated institutional investors.
- While structured finance assets can be difficult to price due to the multiple input variables that must be considered and modeled, investors can nonetheless price them in a transparent and meaningful way.
- In true "buyer-beware" fashion, investors should individually determine an appropriate valuation for each risk factor associated with a given structure by analyzing multiple factors drawn from a pool of existing market conditions, and assumptions about future conditions in the credit and real estate markets. This is akin to an equity investor determining the appropriate price/earnings valuation assumption that should be assigned to the equity market.
- As in any distressed auction, the bidder with the most optimistic assessment of future valuations will submit the winning bid.



November 3, 2008

Underlying Data and Resources

MCRS generates the data and scenario analysis for this original research from the following Fixed Income Risk Management Services' (FIRMS) analytic platform:

ABSXchange/Analytics On Demand (AOD): Runs various hypothetical return and loss scenarios enabling the simultaneous analysis of multiple structured finance deal tranches according to both existing and assumed future market conditions. The applications fully account for all cash flows and waterfall clauses for the individual deal tranches.

Research Output and Analysis

This research paper establishes a pricing matrix as part of a case study of a \$2 billion residential mortgage-backed security (RMBS) under six separate credit-risk stress scenarios. The case study RMBS is backed by three separate pools of U.S. 30-year adjustable-rate mortgages (ARMs) originated in third-quarter 2006. The RMBS whole loan assets are then sliced and diced into approximately 40 individual tranches under the terms and conditions of the RMBS. The geographic exposures of the core residential mortgages backing this structure are: California 60%, Florida 10%, New York 5%, others 25%.

This case study RMBS was selected for analysis both for its broad geographic exposure and the fact that it was originated at about the same time that U.S. housing prices started to decline.

Approximately 85% of the loans were limited-documentation mortgages, and 15% were full documentation. The mortgages are generally one-month negative amortization option ARMs benchmarked at a reasonable spread of 150 basis points (bps) above one-year MTA.

The performance characteristics of the \$2 billion pool of assets underlying this RMBS are as follows as of September 2008:

- 5% annualized prepayment rate currently observed in the underlying pool of assets.
- 10% delinquency rate currently observed in the underlying pool of assets.
- 5% foreclosure rate currently observed in the underlying pool of assets.
- 2% of assets are real estate owned (REO) within the underlying pool of assets.

Our next step is to outline the terms of the six risk scenarios under which we are pricing the cash flows of the individual tranches. These range from scenario 1, which in our judgment approximates where the market is today, to scenario 6, which we consider a worst-case scenario. All six scenarios assume the immediate liquidation of underlying collateral upon default:

Scenario 1

5% prepayment rate

5% expected cumulative defaults over the next 12 months

20% loss severity

Scenario 2

5% prepayment rate
10% expected cumulative defaults over the next 18 months
25% loss severity

Scenario 3

5% prepayment rate
15% expected cumulative defaults over the next 24 months
30% loss severity

Scenario 4

5% prepayment rate
20% expected cumulative defaults over the next 30 months
35% loss severity

Scenario 5

5% prepayment rate
25% expected cumulative defaults over the next 36 months
40% loss severity

Scenario 6

5% prepayment rate
50% expected cumulative defaults over the next 24 months
50% loss severity

The cash flows of all tranches are being discounted with a margin of 250 bps to the specific benchmark used to value each RMBS tranche. We selected a 250-bp discount margin because we believe it is an acceptable and sufficient compromise representing the current amount of stress embedded in global credit markets relative to the 10- to 120-bps margin spreads assigned to individual tranches at the time of origination. This additional stress includes market risks above and beyond the modeled anticipated cash flows under different scenarios for defaults and loss severity. Examples of these risks include political risk, issuer solvency risk, and investor confidence in the U.S. financial sector generally.

We are basically saying that confidence in the credit markets has deteriorated to the point that the riskiest tranches (i.e., +120 bps at origination) should now be discounted at minimum at a rate of +250 bps to one-month LIBOR. Investors could easily assign different discount margins to different RMBS tranches according to market risk, but we have settled on +250 bps for the sake of keeping the focus on other variables such as mortgage defaults and collateral loss severity. Note that the +250-bps discount margin is above and beyond the historically wide credit spreads currently seen in the money market between LIBOR and the Fed funds target rate.

Under the six scenarios outlined above involving various combinations of mortgage prepayments, defaults, and loss severity, the table outlines the net present value (NPV) for each individual tranche of the RMBS under each hypothetical scenario. We have highlighted in red shading the tipping point where the hierarchical nature of the RMBS investment structure kicks in under each scenario. These are the inflection points where the senior tranche holders obviously begin to benefit at the expense of the expected cash flows of the lower tranche investors due to the shortfall of originally anticipated mortgage payments.

RMBS Tranche Valuations

■ Greater than 70% NPV
 ■ Tipping Point, less than 70% NPV
 ■ Significantly below 70% NPV

RMBS Tranche	Original Standard & Poor's Rating	Scenario 1 NPV	Scenario 2 NPV	Scenario 3 NPV	Scenario 4 NPV	Scenario 5 NPV	Scenario 6 NPV
A	AAA	99.71	99.70	99.68	99.66	99.63	99.70
B	AAA	93.68	93.88	94.03	94.10	93.25	81.89
C	AAA	93.68	93.88	94.03	94.10	93.25	81.89
D	AAA	93.54	94.17	94.59	94.83	90.24	74.41
E	AAA	90.05	90.35	90.60	90.69	90.22	79.41
F	AAA	89.95	90.23	90.46	90.55	89.70	78.75
G	AAA	89.95	90.23	90.46	90.55	89.70	78.75
H	AAA	85.56	85.94	86.28	86.41	85.51	74.26
I	AAA	84.88	85.33	85.72	85.87	85.14	72.87
J	AAA	77.63	78.01	78.41	78.52	80.30	69.03
K	AA+	78.89	78.76	77.21	75.76	8.85	2.35
L	AA+	78.44	78.12	76.53	76.70	8.40	2.34
M	AA	79.09	78.96	77.42	7.81	6.03	1.64
N	AA	78.64	78.32	76.75	9.96	5.66	1.66
O	AA-	79.38	79.26	56.34	5.52	4.02	1.06
P	AA-	78.85	78.53	61.86	5.10	3.81	1.17
Q	A+	80.18	79.98	6.17	4.24	2.90	0.83
R	A+	79.76	79.45	5.65	4.00	2.83	0.95
S	A	80.57	79.12	4.56	2.85	1.82	0.54
T	A	80.16	79.20	4.26	2.79	1.88	0.70
U	A-	81.37	58.12	3.17	1.85	0.98	0.35
V	A-	80.97	63.92	3.13	1.92	1.22	0.38
W	BBB+	85.33	26.42	2.48	1.43	0.64	0.38
X	BBB+	84.13	9.90	2.31	1.11	0.41	0.37
Y	BBB	86.83	3.29	1.63	0.64	0.40	0.39
Z	BBB	85.62	3.30	1.47	0.49	0.40	0.39
AA	BBB-	86.09	1.92	0.63	0.40	0.40	0.39
AB	BBB-	86.09	1.78	0.53	0.41	0.41	0.39
AC	BB+	72.62	0.67	0.40	0.40	0.40	0.39
AD	BB+	41.79	0.50	0.41	0.41	0.41	0.39
AE	BB	0.94	0.40	0.40	0.40	0.40	0.39
AF	BB	0.78	0.41	0.41	0.41	0.41	0.39
AG	NR	5.46	5.39	5.36	5.34	5.32	0.39
AH	NR	3.93	3.86	3.83	3.81	3.80	0.39
AI	NR	0.41	0.41	0.41	0.41	0.41	0.39
AJ	NR	0.41	0.41	0.41	0.41	0.41	0.39
AK	NR	0.40	0.40	0.40	0.40	0.40	0.39
AL	NR	0.40	0.40	0.40	0.40	0.40	0.39

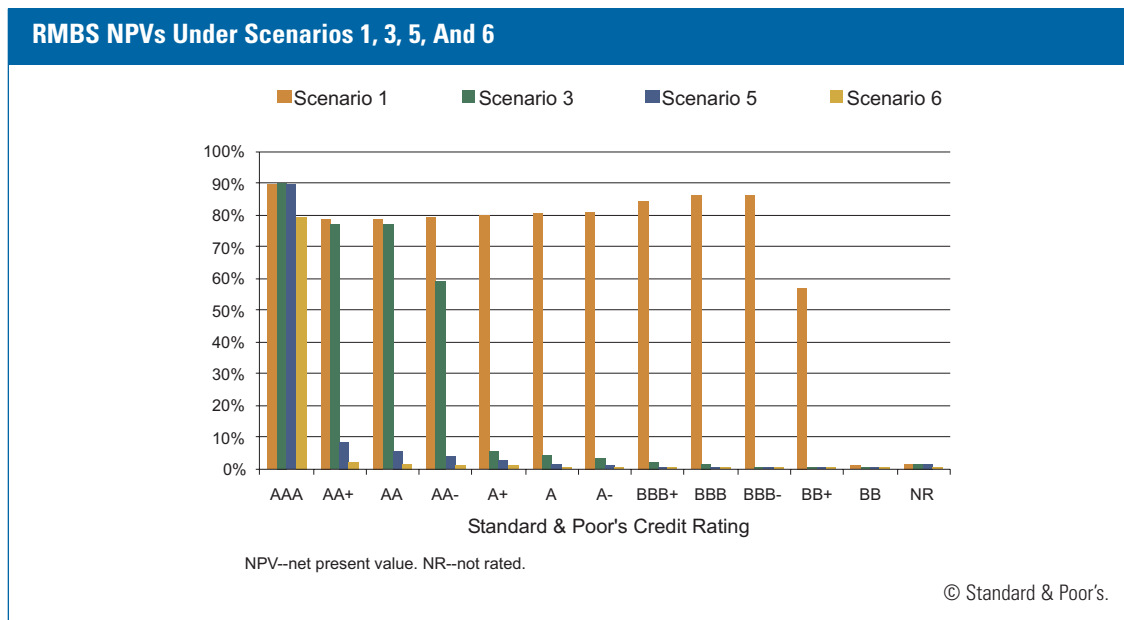
NPV—Percent of net present value.

Scenario 1 closely resembles the fundamental conditions for the pool of assets backing this RMBS according to loan level data as of September 2008. With 5% defaults occurring over the next year leading to a 20% loss on underlying collateral, we see that 76% of the tranches price 73% or higher. The RMBS tranches below “AC,” however, will see the majority of their invested capital lost even under today’s generally stressed, but far from worst-case scenario.

Scenario 2 takes the underlying default rate up to 10% over the next 18 months, resulting in a 25% loss severity at liquidation. Under this small increase in economic stress, the ratio of tranches priced above/below 70% drops nearly to even at 20:18. Notably, the pools referenced between “X” and “AC” that previously expected to see 73% to 84% of their capital returned under Scenario 1 will now see less than 10% of their capital returned under Scenario 2. That’s a sharp difference from just a 5% uptick in defaults and loss severity from Scenario 1.

Scenario 3 takes defaults up to 15% over the next two years with 30% ultimate loss severity, which may not be as far-fetched as it appears considering the U.S. economy’s recessionary conditions. This scenario sees the ratio of tranches priced above/below the 70% threshold dropping to 14:24, or nearly twice as many poorly performing tranches as those that are holding their own, largely at the expense of the lower classes.

Scenario 4 starts to go into the truly scary hypothetical economic situations, represented by a 20% cumulative default rate over the next 30 months resulting in 35% loss severity. Even under this dire situation, we see only a marginal uptick in the number of nonperforming tranches, which is hardly good news since the 70% NPV ratio jumps to 12:26. The NPV destruction is particularly nasty for any of the tranche holders of this RMBS below the “L” tranche where most drop precipitously into single-digit NPVs.



Scenario 5 sees defaults reaching 25% of the pool over the next three years resulting in a 40% loss severity after collateral liquidation. Even after considering such a dark and unlikely set of circumstances, the top 26% tranches will retain more than an 85% NPV, but again at the expense of the lower tranches. The ratio of tranches priced above/below the 70% NPV threshold drops to 10:28, essentially wiping out tranches “K” through “AL”.

Scenario 6, our worst case, envisions 50% of the loans defaulting in just the next two years, resulting in 50% loss severity of the underlying collateral. Under this “dark day” scenario, only a single tranche retains its full value. A total of nine tranches remain above the 70% NPV threshold, with tranche “J” just missing the cut. No less than 28, or a substantial 74%, of the tranches are essentially wiped out.

RMBS tranche repayment structures are generally referred to as a waterfall, but what is apparent across all scenarios of this case study is that they would be better described as a cliff. Once the point is crossed where the upper tranches are being supported largely at the expense of the lower tranches—as opposed to the originally anticipated cash flows of the underlying pools of mortgages—the NPVs of the lower tiers essentially fall off a cliff, with fatal results. The chart portrays the sharp NPV destruction of the waterfall/cliff characteristics across original credit ratings for this RMBS.

Concluding Thoughts

This case study has been very enlightening on so many different levels of evaluation:

1. First, even after factoring in multiple outcomes ranging from current- to worst-case scenarios, it becomes abundantly clear that not all RMBS tranche portfolios are created equally. Even under the worst economic cases imaginable, the upper-tier tranches will see their capital entirely returned, largely at the expense of the lower-tier tranches' claims on actual cash flows.
2. Under existing conditions in the U.S. real estate market of double-digit declines in home prices and unprecedented mortgage default rates, the lower-tier RMBS tranches have little value other than an out-of-the-money call option on the quick recovery of the U.S. housing market.
3. As far as valuing the midtier RMBS tranches, the devil is truly in the details of your assumptions regarding the future path of home prices and mortgage default rates. As we have clearly displayed in our data output and analysis, there is a fine line, or tipping point, between receiving a substantial portion of all anticipated cash flows and the risk of total ruin.
4. The difference between carrying a midtier RMBS on the balance sheet at 80 cents on the dollar and less than 10 cents on the dollar can be as little as a 5% difference in assumptions over future default rates.
5. When it comes to the mark-to-model pricing assumptions for any given structured finance deal, beauty is truly in the eye of the beholder. A complex asset such as the RMBS in this analysis needs to be constantly repriced according to the multiple variables, such as default rates and

- recovery values that affect pricing. Even the assignment of the appropriate discount margin for valuing each specific tranche is largely a subjective decision left to the owner of the security.
6. Investors need to fully understand the risks they are assuming according to where their chosen tranche falls in the risk-return waterfall. An RMBS tranche that was correctly priced at the start of 2006 in an environment of few defaults and stable real estate values could quickly become a completely different risk profile amid the rising defaults and declining home prices seen at the start of 2008.
 7. With hindsight, it now seems obvious that prior to 2007, the credit markets were priced for perfection in a world of historically low interest rates, historically low volatility, and historically tight credit spreads. U.S. five-year Treasury yields, five-year U.S. dollar swap spreads, and the CBOE Volatility Index (VIX) were all at the low end of their respective historical ranges.
 8. The mistake many investors made was not that risk assets were incorrectly priced prior to 2007. The mistake was assuming that near-perfect credit conditions would last indefinitely into the future. Many homebuyers financed with negative-amortization one-year option ARMs made the same mistake.
 9. Investors who were quick to identify the early signs of credit degradation and then correctly modeled the potential mark-to-market risks to their portfolio or balance sheet were well positioned to manage downside exposures. For many investors and institutions, the challenge was either too complex or too daunting in terms of magnitude for them to effectively hedge their risks.
 10. As previously stated, our NPV calculations are based on a 250-bp discount margin spread to 1-month LIBOR, and a fixed prepayment rate of 5%. Although, we selected a 250-bp margin for the sake of simplicity, in reality, the upper-tier tranches deserve a tighter discount margin than 250 bps, while the lower tiers could be discounted at 500 bps, or higher, considering the elevated risk of ruin.
 11. We find it interesting that the LIBOR market in reality is already charging a higher discount margin that is embedded in the historically wide spreads currently seen between LIBOR and overnight Fed funds. In a normal market, distressed credit spreads would mostly be reflected in the asset or asset class that is predominantly experiencing the stress. Since the RMBS market is so large and so widely held by financial intermediaries, the stress in the mortgage market has become systemic and is being reflected daily in the extremely wide LIBOR/Fed fund spreads. So in a sense, our 250-bp discount margin can be as wide as 500+ bps on any given day after incorporating the hefty risk premiums being applied to LIBOR. The market is efficient after all, even when it is dysfunctional.
 12. Considering that the credit markets were priced for perfection around the time that this RMBS was originated, we conclude that many mid- and lower-tranche investors likely did not fully understand the credit risks they were engaging for the mere 100+ bps, or considerably less, they were picking up above one-month LIBOR.

What We Have Learned

Relatively speaking, this was a fairly easy structured finance asset to evaluate. This RMBS case study lends itself to a sufficiently robust NPV calculation due to the availability of reasonably reliable pricing inputs, such as regional real estate values, mortgage prepayments, and delinquencies and default rates. We limited our choice of variables to defaults and loss severity to keep our scenario data output to a scale that is easily manageable. We could have added numerous variables resulting in exponential growth in the simulated output of pricing scenarios. A few examples of the multitude of additional pricing criteria that should be considered in a more detailed pricing analysis would include:

- Number of months leading up to collateral liquidation.
- Mortgage prepayments as a variable, subject to other market conditions.
- Modeled discount margins according tranche position along the waterfall.
- Different default rates for the three separate asset pools backing the RMBS.
- Different default rates according to geographic exposure of each asset pool.
- Varied default rates depending on owner-occupied, second-home, investment.
- Different rates of default and loss severity depending on LTV ratio or mortgage documentation.

The real challenge is assigning the correct valuation for the many variables that affect pricing. We deliberately avoided the pricing of more complex structures such as interest-only or principal-only RMBS tranches, which can be modeled using ABSXchange, but we chose not to model them for the sake of simplicity. For this same reason, we have also initially steered clear of pricing a CDO or a more esoteric synthetic CDO. That said, it is also fairly easy to see how any portfolio of credit instruments can conceivably be assigned an NPV predicated on the availability of reasonably reliable assumptions about credit, loan performance, and underlying asset valuation/recovery data. MCRS plans to conduct a more detailed valuation case study of a CDO in the near future.

As in any exchange- or non-exchange-based transfer of assets from a seller to a buyer, the value of the item being exchanged is subject to both long- and short-term assumptions about valuation. In high-credit-stressed times like today's, these exchanges are often facilitated from "weak hands" to "strong hands," where the seller is abandoning prior presumptions about valuation, while the buyer may simply be assigning a more rational and conservative set of assumptions about valuation.

As our analysis of individual RMBS tranche tipping points clearly illustrates, the closer that economic fundamentals inch toward tranche insolvency, the greater the incentive to accurately price your assets and adjust your overall risk profile. Under current circumstances, when it comes to opaque Level 3 assets like the one evaluated in this paper, there is justification for a much-wider-than-normal spread between the valuation assumptions of the "strong hand" buyer (i.e., bid) and the "weak hand" seller (the offer). For upper-tier assets along the RMBS credit ladder, this may mean very little differences in pricing, but for the mid- and lower-tier assets, the differences between bid and offer in some instances will be staggering.

Method and Analytics

We used ABSXchange and the related AOD applications to conduct this valuation exercise. ABSXchange is essentially an NPV calculator with performance history and portfolio monitoring capacity that permits the pricing of complex structured finance securities such as RMBS. Valuation calculations are based on user-defined combinations of cash flow criteria such as prepayments, delinquencies, defaults, time period to underlying collateral recovery, and ultimate loss severity. We separated our criteria into two categories—constants and variables. Prepayment rates, time period to recovery (i.e., collateral liquidation), and discount margin were our constants, while cumulative defaults and ultimate loss severity were our variables.

Notes

Notes

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