

AD&Co News – June 08

The Times May Be A-Changin'...But There is Still Time to Register

By Rob Landauer

The presentations are being polished, the panelists are caucusing, Bob Dylan is tuning up his guitar and classic raspy delivery....all that is missing is you and your colleagues at AD&Co's 16th Annual Conference on June 11th in New York and June 16th in San Francisco. If you have not already registered, there is still time to let us know your intentions [by clicking on this link](http://www.ad-co.com/Conference/Registration.htm) (<http://www.ad-co.com/Conference/Registration.htm>). All registrations must be completed by Friday, June 6th. There is no cost to attend so hop on the subway, bus, train or plane and join us.

The conferences will provide an unparalleled opportunity to hear the thoughts and wisdom from key participants in the US residential mortgage market as well as from the thought leaders at AD&Co who develop the analytical tools and models needed to help you better manage risk and assess value. For more details on the agenda, [please click here](http://www.ad-co.com/Conference/Agenda.htm) (<http://www.ad-co.com/Conference/Agenda.htm>).

If you have any questions about the conference, please do not hesitate to contact Laura Gridley, or your account manager Matt or Suzanne. We look forward to seeing you in New York or San Francisco over the next few weeks. Safe travels!!



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Prepayment Update – June 08

Tuning Recommendations for Agency ARM Prepayment Models

By Dan Szakallas

Last month we discussed a variety of tuning recommendation for the AD&Co suite of prepayment models. We focused on fixed-rate Agency collateral, and both ARMs and fixed-rate Non-Agency collateral. We have conducted further analysis so that we may share some insight into tunings for the Agency ARM models, specifically for hybrid collateral. We'll look at prepayment model versions 5.2 and 5.1.

Looking at the 3/1, 5/1, 7/1 and 10/1 FNMA and FHLMC models, we can see that model speeds are too fast over the last 9 months. One-month speeds for these pools have fallen into the low twenties and mid-teens, and have stayed there for quite awhile. Our goal is to improve model fit over the last 9 months using our Dynamic Performance Reports (<http://dynamic.ad-co.com/performance/>), while also looking at lifetime CPR forecasts, durations, and OAS values. The challenge that arises is that since the models do not have a time factor built in to the tunings, any tunings applied affect the entire vector of prepayments forecasted for the life of the pool. This can cause OAS values and durations to rise noticeably, since any attempt to slow down the model to fit today's market will slow down forecasts for the life of the pool. This dynamic is reason that we discussed short-term vs long term tuning back in December's Pipeline (<http://www.ad-co.com/newsletter/issues2007/dec07special.htm>).

For those who are doing analyses that are heavily weighted towards the next 6 months, these tunings should do well in bringing model speeds in line with actual prepayments. For those who run mostly valuation analyses, the graphs at the end of this article display how OAS and duration values from AD&Co's valuation system change when the new tunings are applied.

In version 5.1 and prior, the hybrid ARM models are not as flexible when it comes to tuning. For these versions we have recommended changing only the scale tuning. This will simply scale the forecasted vector of prepayments for each month by the value given, functioning as a direct multiplier onto the outputted SMM or CPR. These recommended tunings are listed below

V5.1 and prior

Loan Type	Scale
FNMA, FHLMC 3/1	0.8
FNMA, FHLMC 5/1	0.7
FNMA, FHLMC 7/1	0.65
FNMA, FHLMC 10/1	0.8

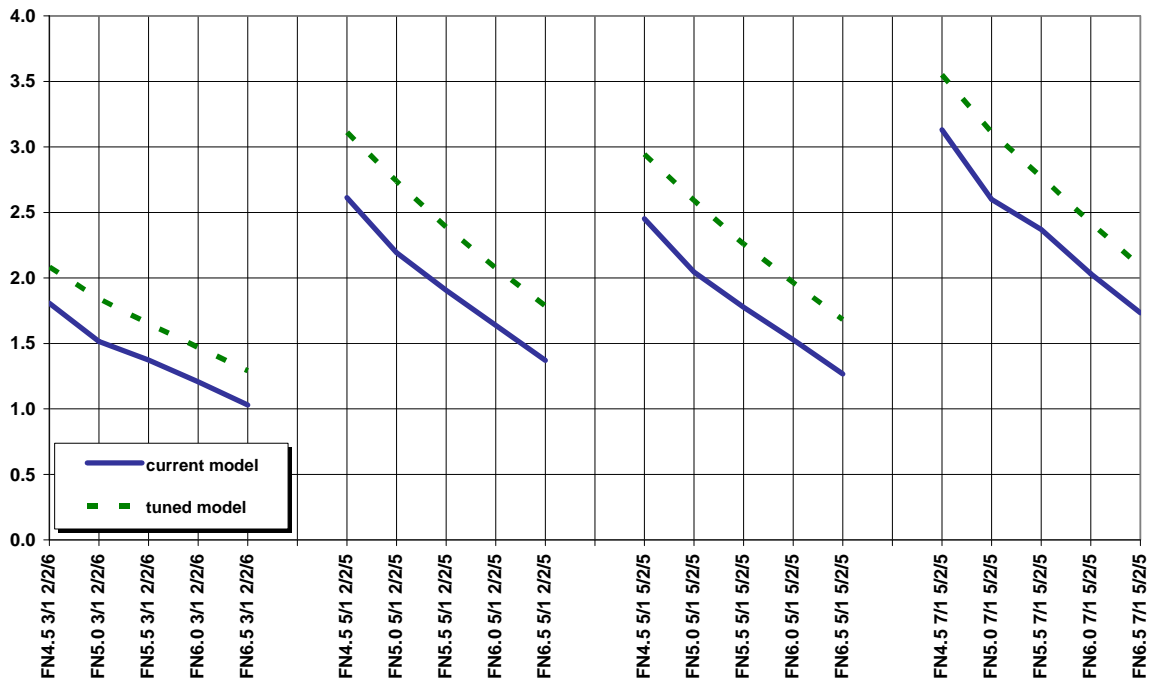
In version 5.2, we utilize slide tuning because it allows us to account for the difficulty of refinancing in the current environment.

5.2c and later

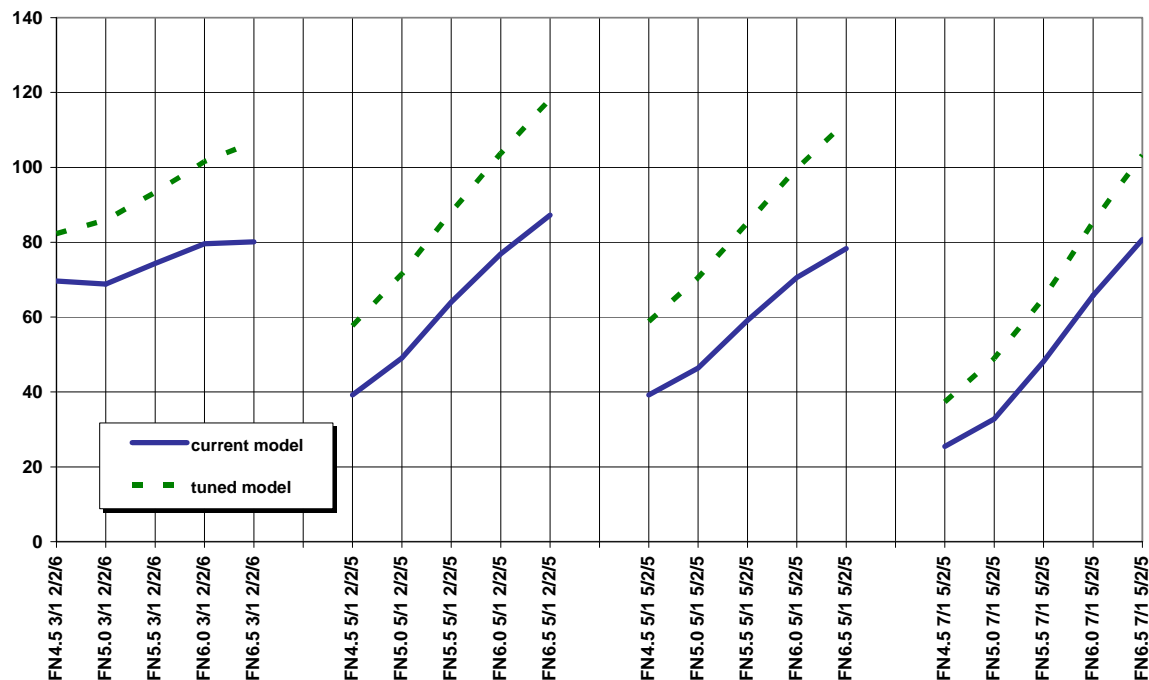
Loan Type	Slide
FNMA, FHLMC 3/1	100bps
FNMA, FHLMC 5/1	100bps
FNMA, FHLMC 7/1	75bps
FNMA, FHLMC 10/1	50bps

If these values are entered into the Dynamic Performance Reports (<http://dynamic.ad-co.com/performance/>), the results will show how these recommendations improve model fit over the last 6-8 months. We have also provided a graph below that illustrates the effect on OAS and duration for version 5.2d.

OAD comparison



OAS comparison



As always, we plan to monitor these recommendations over the coming months, and make any adjustments as necessary. Additionally, these results are posted on our web site:

<http://www.ad-co.com/support/user/TPR52.htm>

<http://www.ad-co.com/support/user/TPR51.htm>

<http://www.ad-co.com/support/user/TPR502b.htm>

If you have any questions, please contact Dan Szakallas at 212-274-9075 or dans@ad-co.com.



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Valuation Commentary – May 08

The Breakpoint Grid

By Alex Levin

In this article we introduce a concept that AD&Co has developed and been using for a number of recent credit-focused projects including consulting assignments. It combines the ideas of dynamic continuous credit rating, stress risk analysis, and the probabilistic angle of view at losses. In future articles we plan to share more related research results, details, options and applications of the method. This article should be viewed as an “opening statement” for the method.

Terminology

Breakpoint (BP) – a market scenario, out of a sorted set, that forces a non-agency bond to lose its 1st dollar of principal. This term can be generalized to describe a scenario causing a bond to lose exactly 25% of principal, 50% of principal, etc.

Breakpoint Ratio – breakpoint scenario’s metric (relative to the base case) such as a collateral loss ratio, CDR (or MDR) scale ratio, generic “scale” of sorted scenarios, etc. This is an estimate of distance-to-default and is the basis for dynamic rating. If the base-case collateral loss is estimated at 10%, and a bond’s breakpoint collateral loss is 20%, one says the Breakpoint Ratio for this bond is 2.0.

Breakpoint Grid – a user-defined set of stress scenarios, sorted in order of increasing losses. A bond’s breakpoint is usually located between two adjacent grid points (if found), or lies outside the grid (if not found or non-existing).

The Vasicek distribution – a theoretical probability distribution of 1-period default rates in an infinite cohort of identical loans. This is a two-parameter curve that is driven by the default probability of an individual borrower (same for all borrowers) and the correlation between individual assets’ values (same for any pair of borrowers).

The Breakpoint Ratio

Only lazy market participants have not criticized rating agencies as of late. The credit ratings, meant to provide a certain degree of investor confidence, clearly failed to do so. AAA-rated non-agency securities are not immune to losses anymore. Furthermore, rating agencies maintain a conservative stance on their initial ratings and don’t downgrade existing bonds often. Hence, credit ratings have become MBS/ABS vestiges: they still exist, but have lost the original importance.

Unlike agency ratings, AD&Co’s breakpoint ratios change continuously. They reflect the dynamics of interest rates and home prices, as well as monthly updated delinquency composition. A shrinking ratio points to credit deterioration well in advance of an official downgrade. For example, we analyzed a AAA mezzanine bond backed by an Alt-A collateral of option ARMs that was put on negative watch earlier this year. By the time it happened, the Breakpoint Ratio already had fallen to 0.65 and the bond was projected to lose over 20% of its principal on AD&Co’s model. Some AAA bonds we have analyzed still maintain their initial rating, but our assessment of the Breakpoint Ratio, in a 0.8 – 1.5 range, indicates that the write-downs are not unlikely to occur in the future.

In our analytical work we consider several possible definitions for the Breakpoint Ratio:

A. The explicit MDR vector scale that breaks the bond.

This simple and easy-to-understand measure is almost model-free and closely related to the Vasicek distribution scale (see below). Its downside is that not all senior bonds can break even under 100 MDR if the loss severity scale is frozen.

B. Collateral cumulative loss scale, i.e., a ratio of collateral loss that breaks the bond to the collateral loss under the base case (“Simple BP Ratio” – see Exhibit 1).

This measure is rather robust, too. Its main disadvantage is that the risk of losing in the same scale is not equally presented in different pools. Let us compare two hypothetical deals, one new (no delinquencies) and another one very seasoned with lots of delinquent loans (hence, with high certainty of losses). A Breakpoint Ratio of 2.0 should point to a higher risk level for the new deal than for the old one.

C. Collateral cumulative loss scale computed for current loan only (“Extended BP Ratio” – see Exhibit 1).

This metric is free of the issue pointed out for B.

D. User-defined, grid-specific scale.

A user can enumerate scenarios in a customized fashion. For example, “Scenario 1.0” can be the base case. “Scenario 2.0” can feature a user-defined combination of inflated MDR scale, and/or Severity scale, and/or home price shifts, etc. Then, a breakpoint of 1.65 can be interpreted as an “interpolated” scenario. The same measure can be viewed as the Breakpoint Ratio.

Exhibit 1. Examples of Breakpoint Ratio computation

Deal ID	Bond	(A)	(B)	(D)	A/B	[A-(B-D)]/D
		Break Point Future Loss	Expected Collateral Loss	Expected Collat Losses for Current Loans	Simple BP Ratio	Extended BP Ratio
NAA06AR1	AVI	21,803,054	12,277,706	5,942,971	1.78	2.60
CWF05025	A11	13,585,643	9,184,583	8,807,148	1.48	1.50
DAA050006	IIA3	32,020,475	19,607,642	16,446,564	1.63	1.75
WFM0701	IA22	60,598,456	80,537,621	80,488,665	0.75	0.75

The first bond (AV1) in Exhibit 1 has a simple BP Ratio of 1.78, which, simply interpreted says that losses on the entire collateral of the deal would have to be 1.78 times greater than the expected losses for this bond to reach a breakpoint. The Extended BP ratio suggests that the expected losses of the currently performing loans would have to be 2.6 times their expected losses for the AV1 class to risk a principal write-down. In contrast, the last bond in the table (IA22) has a very low BP Ratio, simple and extended. According to the Simple and Extended BP Ratios, only 75% of the expected collateral losses would have to occur for this bond to break.

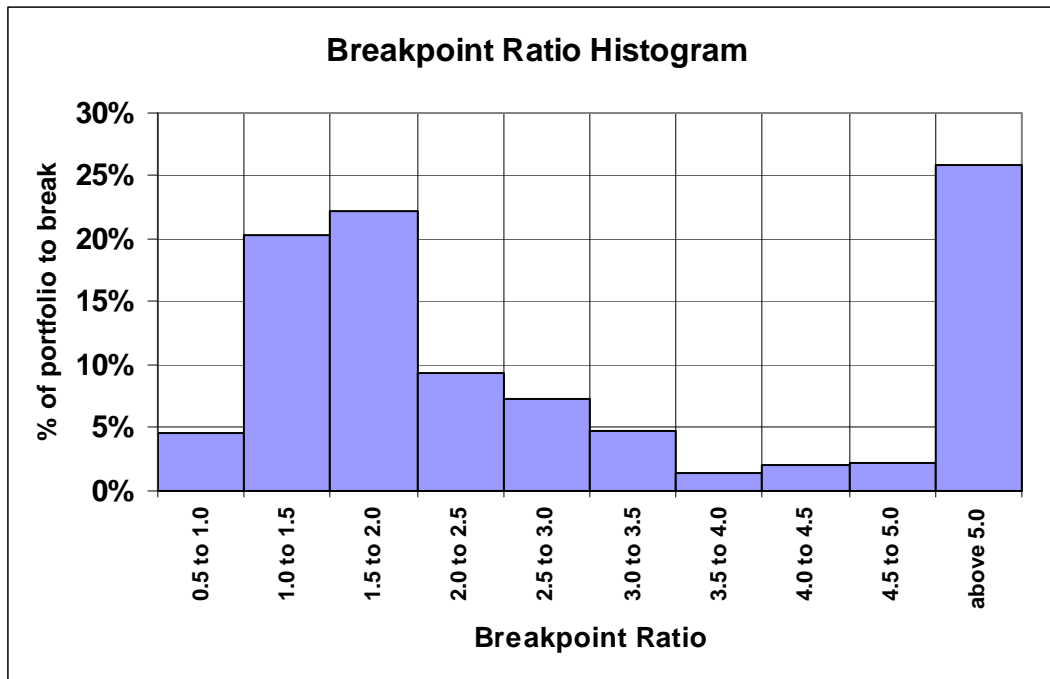
Naturally, the Extended BP Ratio is always larger than the Simple BP Ratio if a bond doesn't break at the base case; it is smaller if a bond breaks. These two measures are close to one another for new bonds – like the last bond in Exhibit 1.

A Breakpoint Ratio Histogram

For portfolios of MBS or ABS, Breakpoint ratios can't and shouldn't be aggregated. For example, if one possesses a portfolio of equally weighted bonds from Exhibit 1, the averaged BP Ratio will surely exceed 1.0. However, the IA22 bond, hence the entire portfolio, does lose in the base case, so the average BP Ratio is rather misleading.

A histogram of Breakpoint Ratios displays more informative statistics. For example, Exhibit 2 depicts the results for the analysis of an AAA MBS portfolio sorted by the Breakpoint Ratio.

Exhibit 2. Histogram of Breakpoint Ratios



For the histogram, we defined the Breakpoint Ratio as the MDR scale (version A from the above list of choices). About 5% of the portfolio should have been downgraded by major rating agencies for having a BP ratio below 1.0 – those bonds are expected to experience principal write-down even at the base case. Bonds having BP ratios between 1.0 and 1.5 (20% of the portfolio)

are the next candidates for downgrading, etc. Therefore, the Breakpoint Histogram is a useful first sketch of portfolio credit risk.

The Breakpoint Grid

How, speaking technically, would we calculate the Breakpoint Ratio? We would have to iterate over a set of credit scenarios until the bond's write-down becomes equal to the target (with some accuracy). In the process, we have to inspect the results of these iterations, which, if not discarded, can become a good credit risk report!

So, instead of starting with the Breakpoint Ratio search, we first define a grid of stress scenarios (MDR scales, and/or Severity Scales, and/or HPA assumptions, etc.) sorted in order of increasing losses that may be of interest for credit risk management. Using our LoanDynamics™ Model (LDM) we will forecast prepayments, defaults, losses, and bond write-downs for each of the scenarios. This process delivers a valuable risk metrics and, at the same time, narrows the search interval for the Breakpoint. For example, Exhibit 3A shows a Breakpoint Grid set in scale of base-case MDR vector predicted by the LDM. Once each grid point was analyzed, the Breakpoint search was performed between scenario scales 1.0 and 1.5.

Exhibit 3A. Breakpoint Grid in Scale of MDR

<i>input</i>		<i>output</i>				
Scenario "Scale"	MDR scale	Cum writedown	Cum Loss	Cum Default	Avg CDR	Simple BP Ratio
	0.0	-	-	-	0.0	0.00
	0.5	-	2.8	13.6	2.4	0.57
base case	1.0	-	4.9	23.4	4.6	1.00
	1.5	0.01	6.5	31.0	6.5	1.34
	2.0	0.11	7.9	37.2	8.4	1.62
	2.5	0.44	9.0	42.4	10.1	1.86
	3.0	1.03	10.0	46.7	11.8	2.06
	3.5	1.68	10.9	50.4	13.4	2.24
	4.0	2.35	11.6	53.6	14.9	2.40
	4.5	2.98	12.3	56.5	16.3	2.53
	5.0	3.59	12.9	59.0	17.7	2.66
breakpoint	1.46	0.01	6.4	30.4	6.4	1.31

Note that the simple collateral loss ratio grows slower than the MDR scale. Collateral life contracts with faster termination, both voluntary and mandatory. Therefore, the cumulative default rate (% of loans defaulted) and the cumulative collateral loss can't grow with the exact pace of CDR. This explains why the Breakpoint Scale is 1.46 whereas the Simple BP Ratio is only 1.31.

Exhibit 3B depicts the Breakpoint Grid construction using a combination of two HPA shocks, the short-term shift and the long-term shift. Note that the short-term HPA rate is an instantaneous rate annualized. It is not equal to the 1st-year HPA rate, which is comprised of 63% of the short-term HPA and 37% of the long-term HPA. The 2nd-year HPA is comprised of 23% of the short-term HPA and 77% of the long-term HPA, etc. The cumulative loss and default levels for Breakpoints

shown in Exhibits 3A and 3B are comparable to each other although not identical due to some difference in predicted vectors.

Exhibit 3B. Breakpoint Grid of HPA shocks

	<i>input</i>				<i>output</i>				
	"Scale"	Yr1 HPA	Yr2 HPA	Long-term HPA	Cum writedown	Cum Loss	Cum Default	Avg CDR	Simple BP Ratio
	0	1.0	4.9	7.2	0.0	0.0	0.0	0.0	0.00
	0.5	-0.7	4.0	6.7	0.0	2.2	12.4	2.3	0.46
base case	1	-2.5	3.0	6.2	0.0	4.9	23.4	4.6	1.00
	1.5	-4.2	2.0	5.7	0.3	8.5	34.3	7.1	1.75
	2	-6.0	1.1	5.2	3.8	13.8	45.6	10.0	2.84
	2.5	-7.8	0.1	4.7	10.1	20.9	56.8	13.1	4.31
	3	-9.5	-0.8	4.2	17.3	28.2	65.9	16.5	5.81
	3.5	-11.3	-1.8	3.7	22.7	33.4	71.8	19.4	6.88
	4	-13.0	-2.8	3.2	26.5	36.7	75.7	22.0	7.56
	4.5	-14.8	-3.7	2.7	29.2	39.1	78.5	24.3	8.05
	5	-16.6	-4.7	2.2	31.3	40.8	80.7	26.4	8.41
breakpoint	1.75	-5.1	1.6	5.4	0.0	6.6	28.9	5.8	1.35

In order to aggregate the Breakpoint Grid for a portfolio, we first need to make sure that each scenario point is common for every position. At first glance, it seems that constructing the grid in terms of a common factor (like a single home price index) makes more sense than using an MDR scale. However, if we extend the notion of “common market factor” and include LDM model risk, we start to understand that an MDR scale can serve the purpose.

Assessing probabilities and expectations

Can we assign each of the stress scenarios a probability? In order to achieve this goal, we normally employ a model that randomly simulates interest rates and home prices (“Credit OAS,” see Levin and Davidson [2008]). Alternatively, we can employ a simpler and intuitive analytical approach offered by O. Vasicek [1991, 2002] who has constructed a theoretical distribution of the infinite-cohort default rate (x) as a function of two parameters, borrowers’ default rate p and the correlation between borrowers’ asset values, ρ . The Vasicek formula is

$$W(x) = N\left\{\frac{\sqrt{1-\rho}N^{-1}(x) - N^{-1}(p)}{\sqrt{\rho}}\right\}$$

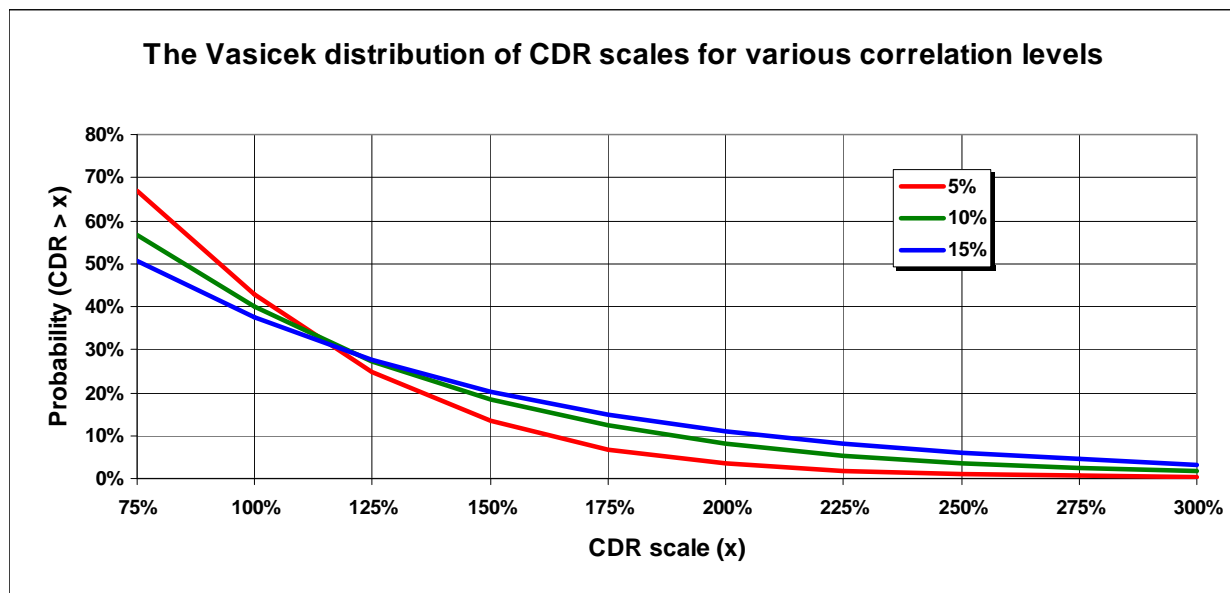
where, as usual, N stands for the cumulative standard normal distribution. Vasicek characterized the distribution as “highly skewed,” which is correct unless $p = 0.5$ in which case it becomes symmetrical.

Correlation between individual borrowers’ default decisions can be explained by their dependence on common market factors. As we mentioned, these factors can be a common HPI index or a common model error.

The Vasicek distribution is almost model-free (under several very simplified and practically unrealistic assumptions) in that it doesn't require explaining loan defaults via complex modeling. We don't need to know which factors affect individual defaults, their volatilities, etc. Everything is given in terms of p and ρ . Individual default rate p can be taken from the LDM whereas the correlation parameter ρ can be recovered from the way the market prices ABS capital structures¹. According to AD&Co's own research, the ABS-implied correlation parameter typically varies between 6% and 15%, but it has been higher during the ongoing MBS crisis. An alternative way of getting correlation can be based on statistics of empirical losses (see Mashayekhi and Wang [2008]). The Vasicek model underlies the Basel II accord, and the 15% level is elected there as the standard (FitchRatings [2008]).

We can apply the Vasicek distribution to the CDR or MDR scales. For each position or a group, we can interpret the CDR scale as a random number so that it corresponds to x in the Vasicek distribution. For example, for a 10% average CDR, $p = 0.1$. A 200% scale will correspond to the random default rate of $x = 0.2$. Then, given correlation ρ , we can compute probability that the default rate doesn't exceed x . Exhibit 4 depicts the probability of not exceeding CDR scales, for 3 different correlation parameters, 5%, 10%, and 15%; a higher correlation leads to a fatter tail.

Exhibit 4. Probability of Exceeding CDR Scenario Scales



In addition to the probability of exceeding the stressed levels, we can compute the probability of reaching the breakpoint. For example, the CDR-based BP ratio of 1.46 shown in Exhibit 3 would point to a 14% to 21% probability, depending on correlation (R_o), in Exhibit 4.

¹ AD&Co's analytical tool that recovers ρ from market prices of tranches (within a single deal) is called the *Implied Default Model* (see Levin and Davidson [2008]).

Putting it all together

We can now combine the breakpoint grid loss results with the probability assessment into one concise report. Results can be presented for each position and/or aggregated by collateral type. This portfolio loss report considered in conjunction with the Breakpoint Ratio histogram (Exhibit 2) delivers the necessary information to assess portfolio credit risk.

Exhibit 5. A sample report of portfolio credit risk

MDR Model Scale	75%	100%	125%	150%	200%	250%	300%
Cumulative collateral loss, %							
ALT A FIXED	6.3	8.0	9.5	10.9	13.2	15.1	16.7
JUMBO FIXED	4.5	5.8	7.0	8.1	10.1	11.7	13.2
...							
OPTION ARM	9.0	11.4	13.5	15.4	18.6	21.2	23.3
Cumulative collateral default, %							
ALT A FIXED	24.2	30.2	35.5	40.2	47.9	54.1	59.1
JUMBO FIXED	20.1	25.5	30.3	34.7	42.2	48.3	53.3
...							
OPTION ARM	23.0	28.8	33.9	38.4	46.0	52.1	57.1
Cumulative bond write-downs, %							
ALT A FIXED	0.0	0.4	1.0	1.6	3.0	4.5	5.8
...							
JUMBO FIXED	0.0	0.3	0.9	1.6	3.0	4.3	5.5
OPTION ARM	0.1	0.3	0.9	2.1	7.1	12.3	16.6
TOTAL, %	<u>0.1</u>	<u>0.2</u>	<u>0.4</u>	<u>1.0</u>	<u>3.3</u>	<u>5.7</u>	<u>7.8</u>
TOTAL, \$M
1.0 - Vasicek probability (chance to exceed)							
<i>Correlation (Ro)</i>							
5%	66.7%	42.9%	24.7%	13.3%	3.5%	1.0%	0.4%
10%	56.6%	39.9%	27.3%	18.4%	8.1%	3.6%	1.7%
15%	50.7%	37.5%	27.6%	20.3%	11.0%	6.0%	3.3%

This article describes a method that AD&Co uses in its credit analysis projects and services for clients. Report samples are shown solely for demonstration purposes. When writing the article, I used materials and views contributed by Anne Ching, Andrew Davidson (who proposed using the Breakpoint Ratio) and Will Searle.

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