Moody's ANALYTICS

RISKCALC FAQ

Calibrating the RiskCalc Qualitative Overlay

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Abstract

RiskCalc™ Plus incorporates a Qualitative Overlay, which users can leverage to incorporate qualitative factors on the credit risk assessment. This FAQ describes some circumstances that may warrant a change on the default parameters, as well as a description of the calibration process.

Introduction

The Moody's Analytics RiskCalc model suite is a collection of quantitative models that derive default probabilities (RiskCalc EDF™ (Expected Default Frequency) credit measures) from the financial statements of individual obligors. We develop RiskCalc models using the Moody's Analytics Credit Research Database (CRD), a collection of data from more than 75 global financial institutions covering more than 68 million financial statements.

The RiskCalc Qualitative Overlay provides an approach for combining EDF credit measures with qualitative information. Since some credit risk determinants cannot be captured by quantitative measures, it is reasonable to add qualitative information into the risk assessment to see if predictive power can be improved.

We provide an initial calibration for the Qualitative Overlay using the United States CRD data. These parameters can be used "out of the box," in the sense that an institution can begin using them immediately, even with little data for the Qualitative Overlay calibration. However, users can also update these default parameters.

When to Adjust the Qualitative Overlay Default Parameters

Some circumstances that could warrant a change on the default parameters:

1. Underlying quantitative model or sample significantly differs from RiskCalc United States — we calibrate the qualitative overlay default parameters using U.S. CRD data. Therefore, if the client's EDF distribution differs significantly from the U.S. development sample, users should consider a calibration assessment. If users are considering a calibration for a country with different risk profile than the United States, they can contact us at MA_support@moodys.com for additional guidance.

2. Changed questions and/or scores in the Qualitative Overlay — the RiskCalc qualitative overlay is based on the qualitative portion of the Middle Market Template, a separate scorecard designed by Moody's in conjunction with a consortium of banks for rating middle market obligors. This portion of the Middle Market Template can be used as is, adjusted, or completely customized to produce a qualitative score for the Qualitative Overlay. If questions, weights, and/or scores are customized, the parameters may need to be tuned. The qualitative parameters are set to have a neutral response of 50 and a standard deviation of 12. We use 55 as the average qualitative score, to add some conservatism.

3. Combined PD results different from intuition — when we use the default parameters for the United States and combine low, mid, and high EDF credit measures with the best, neutral, and worst qualitative answers, we obtain the following results for combined PDs, shown in Table 1.

Table 1

Combined PD Results for a Sample of Companies

	EDF	QUANTITATIVE RATING	QUALITATIVE SCORE	COMBINED PD	COMBINED RATING	NOTCH DIFFERENCE
Low-Best	0.10%	A1	89.77	0.08%	Aa3	-1
Low-Neutral	0.10%	A1	50.36	0.35%	Baa2	4
Low-Worst	0.10%	A1	-0.13	2.47%	Ba3	8
Mid-Best	2.00%	Ba3	89.77	0.53%	Baa3	-3
Mid-Neutral	2.00%	Ba3	50.36	2.36%	Ba3	0
Mid-Worst	2.00%	Ba3	-0.13	10.51%	Caa/C	4
High-Best	10.00%	Caa/C	89.77	2.14%	Ba3	-4
High-Neutral	10.00%	Caa/C	50.36	7.30%	B3	-1
High-Worst	10.00%	Caa/C	-0.13	23.50%	Caa/C	0

We see that a company with a low EDF measure (0.10%) and implied rating A1 receives a one-notch improvement in rating when it has the best qualitative answers for all the questions. The same company receives a four-notch deterioration in rating when it

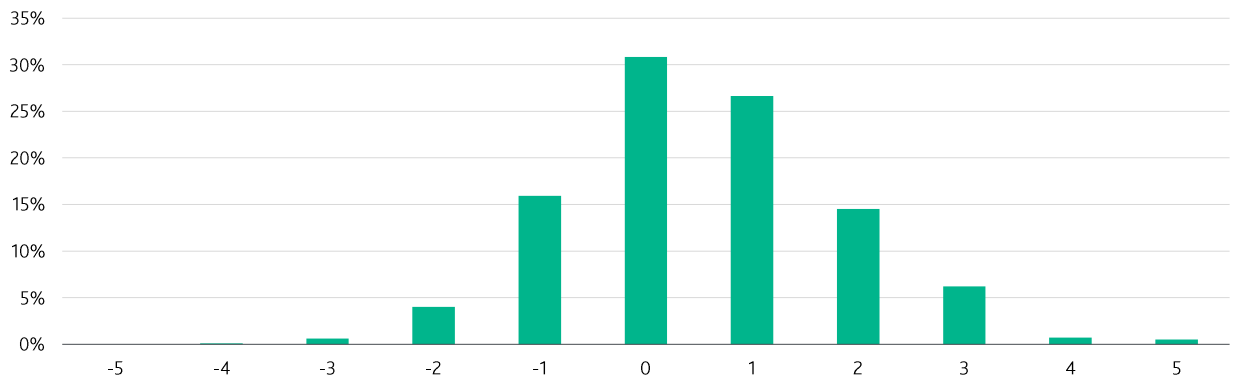
has neutral answers to the qualitative questions, and it receives an eight-notch deterioration in rating when it has the worst qualitative answers for all the questions. Given that the starting EDF value is low, this company needs very good qualitative answers in order to maintain its rating. If the qualitative answers are poor, it receives a significant deterioration in rating.

For a company with a starting EDF measure of 2% and an implied rating Ba3, the best qualitative answers for all questions imply a three-notch improvement in implied rating. Neutral responses do not alter the rating, and the worst responses deteriorate the rating four notches. Given that this company has an average EDF, both good and bad answers alter the rating.

For a company with an initial EDF measure of 10%, the best qualitative answers imply a four-notch improvement in implied rating; neutral responses imply a one-notch improvement, and the worst responses do not alter the initial rating, given that the initial EDF measure corresponds to the worst rating category. When these results differ from the client's intuition, the default tuning parameters can be changed.

When we look at a typical portfolio, we anticipate that the impact of the qualitative factors will sometimes upgrade by one to two notches, sometimes downgrade by one to two notches, and sometimes result in no change in implied ratings. Movements of more than two notches are rare. Figure 1 presents the typical impact we expect. When a client experiences movements that are consistently in one direction or that are large, we recommend an assessment of the calibration for the client's portfolio. In addition, when a client begins using a qualitative overlay, we recommend running a few companies to verify that the results are aligned with the expectations.

Figure 1 Distribution of notch differences for a typical sample.



How to Calibrate the Qualitative Overlay

Clients may follow different approaches when tuning the RiskCalc Qualitative Overlay parameters. For example, one may target the average PD to equal the average of the RiskCalc EDF measure on the calibration sample. Further, one may target the standard deviation of the PD to equal the standard deviation of the RiskCalc EDF measure on the calibration sample. Sometimes, one may have a large data set of actual default events to inform the actual calibration.

Each instance of the scorecard requires the account administrator to set the 10 parameters:

Table 2

Qualitative Overlay Tuning Parameters

PARAMETER	DESCRIPTION
EDF weight	Percent of weight assigned to EDF in the final reported combined measure
Std. Deviation (Qualitative Score)	standard deviation of qualitative score
Avg. Qualitative Score	average qualitative score
EDF Dispersion (Std. Deviation)	standard deviation of normsinv(EDF)

Level of EDF (Average)	average normsinv(EDF)
Correlation (Qualitative Score and EDF)	correlation between normsinv(EDF) and the qualitative score
Modeled Slope	variable to control dispersion of final PDs
Modeled Intercept	variable to control overall level of final PDs
PD Ceiling	highest possible combined PD
PD Floor	lowest possible combined PD

We provide an Excel spreadsheet to assist with the tuning process. To populate the spreadsheet, users require a sample of exposures for which they have both RiskCalc model scores (EDF) and answers to the qualitative questions that tabulate into a qualitative score (QS). The sample should include at least 50 observations, with 100 preferable. The sample should also be representative of the portfolio.

On the spreadsheet, we first calculate the inverse of the standard normal cumulative distribution of the EDF measures and then standardize them to obtain mean zero and variance one:

$$z_{EDF} = \frac{N^{-1}(EDF) - mean(N^{-1}(EDF))}{stdev(N^{-1}(EDF))}$$

We also standardize the Qualitative Scores and multiply them by -1 so that large values are interpreted as elevated credit risk:

$$z_{QS} = -\frac{QS - mean(QS)}{stdev(QS)}$$

The next step is to compute the correlation between z_{EDF} and z_{QS}:

$$\rho = correl(z_{QS}, z_{EDF})$$

We then compute the combined score as the weighted average of z_{QS} and z_{EDF} divided by its standard deviation. We will refer to this quantity as z:

$$z = \frac{w * z_{EDF} + (1-w) * z_{QS}}{\sqrt{w^2 + (1-w)^2 + 2\rho w(1-w)}}$$

Where w is the weight on the quantitative score z_{EDF}. By construction, z will have a mean of 0 and a standard deviation of 1.

Once we have this quantity, it must be converted back to PD. The Qualitative Overlay implements this formula:

$$PD = \min(\max(normsdist(intercept + slope * z), floor), ceiling)$$

using four parameters: ceiling, floor, intercept, and slope.

The Excel spreadsheet computes the following tuning parameters: Std. Deviation (Qualitative Score), Average Qualitative Score, EDF Dispersion (Std. Deviation), Level of EDF (Average), and Correlation (Qualitative Score and EDF).

Users may adjust the remaining tuning parameters. They may update the minimum and maximum desired PDs produced by the Qualitative Overlay, as well as the EDF weight. The EDF weight determines the relative weight of quantitative versus qualitative scores. Users may also update the intercept to adjust the average combined PD generated by the spreadsheet. For example, users may set the intercept so that the average PD produced by the scorecard matches the average EDF measure in the calibration sample. In addition, users may adjust the slope term to increase/decrease the dispersion of the PDs produced by the scorecard. They may need to repeat until the combined PD values match the desired distribution.

We strongly encourage users to test a sample or a run few cases through the final qualitative overlay, with or without any adjustments in the tuning parameters.

References

Dwyer, Douglas and Heather Russell, "RiskCalc™ Plus Qualitative Overlay: Combining Quantitative and Fundamental Approaches in a Rating Methodology." Moody's Analytics, June 2013.

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