Euler Hermes Rating GmbH

Credit Portfolio Rating Methodology

15 February 2016

formally amended on 14 November 2017

EULER HERMES Rating

A company of Allianz

Content

Introduction

This methodology was introduced in February 2016 and was formally amended on 14 November 2017.

Rating and monitoring processes as well as general information and definitions are included and explained in more detail in the Basic Principles for Assigning Credit Ratings and Other Services, therefore the sections "Basics – Introduction", "Rating Report / Rating Committee" and "Monitoring / Follow-up Rating" are no longer contained in this rating methodology from 14 November 2017 on.

A credit portfolio comprising numerous fixed-income financial instruments[1] such as loans and bonds allows risk to be spread across all the underlying financial instruments by means of diversification. In this way, the risk of a portfolio default is generally less than the individual risk of default by a company or financial instrument.

Whereas a company or project rating assesses the ability of individual issuers or financial instruments to meet their interest and repayment obligations on time, the credit portfolio rating considers the probability of the nominal amount of the portfolio being repaid and the agreed interest payments being made in good time until the end of the portfolio term. The default event is assessed on the basis of the rules set out in the portfolio and/or issue documentation.

The portfolio rating provides the investor with an objective assessment of the risk of default. In addition, the possibility of investing in a rated entity is frequently tied to the rating issued by a renowned rating agency within the framework of regulatory and internal investor guidelines. In this connection, the portfolio rating is not a legal opinion; nor does it measure the expected future market value of the portfolio. However, it does offer a guide to the expected risk/reward profile of an investment.

This Credit Portfolio Rating Methodology supplements the Basic Principles For Assigning Credit Ratings and Other Services as well as the general Project Rating Methodology, which are available on our website. When a portfolio is issued, the Issue Rating Methodology, which is also available on our website also plays a crucial role in the issue rating.

As with any rating methodology, we apply the following methodological principles as a guide and as the underlying benchmark for the rating process. However, the result of such a decision-making process is determined at the Rating Committee's discretion in each individual case. In addition, it should be noted that in view of the economic and legal structure of such portfolios, numerous structural characteristics must be fundamentally factored into the analysis. This means that the credit portfolio methodology permits different structures, which are assessed on a case-by-case basis. Accordingly, this methodology provides the framework for the analysis and is undergoing continuous further development.

[1] This does not include portfolios (X^2 structures).

Areas of Analysis

Quantitative Analysis – Individual Risks

The model-based estimation of risk at the portfolio level is based on the individual risk of the underlying obligors or financial instruments of the portfolio. An assessment of this individual risk calls for the calculation of an individual rating in a preliminary process. Generally speaking, EHR determines the individual ratings of the underlying units. These ratings are prepared in accordance with the Issuer Rating Methodology or the Project Rating Methodology and, where applicable, the Issue Rating Methodology, which are available on our website.

Any external data used must be mapped to probabilities of default assumed in the model. For this purpose, the individual ratings of other rating agencies or creditworthiness assessments acknowledged for regulatory purposes and based on a “through-the-cycle” approach may be included in the analysis. Where applicable, the use of alternative creditworthiness assessments is also possible. When external data is used, EHR examines the underlying valuation system as part of the analytical process. Depending on the validity of the ratings or creditworthiness assessments used, discounts may additionally be applied to the probabilities of default derived from them. A combined use of individual ratings and other creditworthiness assessments is also fundamentally possible particularly for ongoing monitoring and follow-up ratings.

As our Credit Portfolio Rating Methodology pursues a “look-through” approach, the individual ratings or assessments are generally disclosed to the investors. However, an exception can be made depending on the structure of the portfolio or issue.

Quantitative Analysis – Credit Portfolio Risk

The risk at the portfolio level is defined through the distribution of the expected portfolio loss. The loss distribution is estimated on the basis of the composition of the portfolio and the underlying assumptions. In addition to a base-case scenario, various stress scenarios, which are considered to be realistic in the light of the rating agency’s experience and on the basis of historical data are simulated. For this purpose, the assumptions underlying the estimation of loss distribution are stressed. Single-factor stress scenarios are calculated to assess the sensitivity of the results. This chiefly applies to the assumed probabilities of default, correlations and recovery rates. In addition, a business-cycle stress scenario in which all three parameters are simultaneously placed under stress is simulated. Further sensitivity and stress analyses, e.g., with respect to the distribution of the defaults over time, contractual amortisation schedules and possible rights of early loan redemption by the debtor, exchange-rate risks as well as individual structural characteristics of the portfolio or issue are also calculated. The following parameters are incorporated into risk-modelling at the portfolio level:

- Obligor’s ID
- Obligor’s industry
- Obligor’s domicile (country)
- Obligor’s rating
- Outlook
- Watch status
- ID of the financial instrument
- Nominal value
- Ranking
- Collateral
- Maturity
- Amortisation schedule

Further assumptions are made on the basis of these input parameters as a basis for estimating the loss distribution:

Probability of default

The underlying probabilities of default of the obligors are derived from a mapping with empirical default rates with respect to the duration of the financial instruments issued by the obligors. The probabilities of default assumed in the model for each obligor can be adjusted if necessary. This is particularly possible with respect to the rating outlook and a possible inclusion in the watch list. The greater the probability of default, the greater the risk will be at the portfolio level. The probabilities of default are stress-tested in the individual scenarios.

Correlations

The correlations between obligors are calculated for the obligor's country and industry. In this connection, correlations within and between industries and regions are incorporated. Alternatively, correlations may be assumed to be fixed. A generally higher correlation results in a lesser reduction in risk at the portfolio level due to the weaker diversification effects. The correlation assumptions undergo stress-testing in the individual scenarios.

Recovery rates

The recovery rates have a direct impact on the loss distribution of the portfolio. Lower recovery rates result in a higher possible loss over the term of the portfolio. The recovery rate per financial instrument is calculated by reference to its ranking and collateral, and stress-tested in the individual scenarios.

Defaults of obligors or financial instruments during the term of the portfolio are factored into the model and deducted from the nominal value of the portfolio. Dynamic portfolios whose composition may vary as a result of the addition or disposal of the underlying financial instruments during the term of the portfolio are generally reassessed as of the date of the change. Depending on the structure of the portfolio or issue, assumptions are also generally made concerning the future composition of the portfolio and duly factored into the model. As well as this, additional assumptions must be made in connection with certain types of financial instruments such as revolving loans.

Further portfolio characteristics are also taken into account in the estimates if these are considered to be relevant for the risk. Among other things, this includes modelling of portfolios, which exhibit a heterogeneous composition in terms of the duration, rating etc. of the underlying financial instruments or the modelling of durations of financial instruments, which exceed the term of the portfolio.

The loss distribution is estimated on the basis of the scenarios applied using an internal monte carlo simulation. In the next step, the derived portfolio loss distribution is applied to the cash flow model.

Quantitative Analysis – Cash Flow Model

An internal, analytical cash flow model calculates the amount, which is available for covering expected losses, i.e., losses of the nominal value and non-realisable interest payment obligations, on the basis of the income generated by the underlying financial instruments after deducting all costs, realised losses and payouts. This amount is compared with the loss distribution. Additional factors such as estimated defaults over time or premature repayments, which may impact the income/expense profile of the portfolio as well as possible cash reserves and structural characteristics liable to affect the loss coverage, are taken into account. The probability that the amount available is sufficient to cover the expected losses is calculated. The result is then mapped against the corresponding probabilities of default to conclude a portfolio risk assessment. Based on the stress tests described in the Section Quantitative Analysis – Credit Portfolio Risk, a portfolio risk assessment is calculated for each scenario.

The portfolio income is primarily generated by the interest-bearing financial instruments. If a floating, index-tied rate of interest has been agreed, assumptions must additionally be made on future trends in the relevant interest rates. Moreover, income can be generated from the interest received on cash reserves. Expenses at the portfolio level and in connection with the portfolio structure regularly comprise management fees, amounts paid to service providers and non-recurring expenses in connection with the arrangement of the portfolio or issue. If the investor payouts include a variable, index-tied component, the future performance of the index must also be taken into account.

In addition to the loss distribution, the model also estimates the distribution of losses over time. This distribution is included in the cash flow model to determine the portfolio income structure on the basis of the interest income generated. The default events over time are stress-tested in the various scenarios; in this connection, it is assumed that defaults accumulate at the beginning or end of the portfolio duration.

In the event of the insolvency of individual obligors or financial instruments, proceeds are normally generated from the sale of the insolvency estate. With respect to the underlying assumptions, these recovery proceeds are already incorporated into the estimation of the loss distribution. However, there may be some delay after the occurrence of the default event before these proceeds are realised. Depending on the structure of the portfolio or the issue with respect to the income structure of the portfolio, this time lag may be included in the cash flow model and stress-tested.

The quantitative credit portfolio ratings derived on this basis for the scenario in question are used as an input for the qualitative assessment and serve as the basis for the Rating Committee's decision.

Qualitative Analysis – Credit Portfolio Rating

Following a qualitative appraisal of the underlying assumptions and individual scenarios, the portfolio risk assessments derived from the quantitative methodology are aggregated to an overall portfolio risk assessment. In addition, further legal and economic factors in connection with the structuring and management of the portfolio are included in the analysis. These characteristics must be evaluated individually. If the portfolio is issued, structural characteristics, which are related to this issuance must already be taken into account for the credit portfolio rating. The final credit portfolio rating is derived from the inclusion of the qualitative characteristics.

Examples of material qualitative characteristics include the ability to realise the assumed recovery rates, a suitable selection of obligors and underlying financial instruments, a corresponding reaction to a possible deterioration in the credit portfolio rating by adjustments to the measurement parameters and portfolio composition as well as the legal framework with respect to the premature redemption of individual financial instruments or the scope for deferring interest. In addition, risks with respect to the inclusion of further service providers and, based on the documentation, the legal and regulatory risks are also taken into account.

Depending on the structure of the portfolio, it may also be possible to adopt a different modelling approach during the investment and divestment phase. If the portfolio invests over a certain period, assumptions as to its future composition must be made during this investment phase. In this connection, measurements are calculated on the basis of the actual and assumed composition of the portfolio. During the divestment phase, the planned repayments are particularly taken into account. In addition, it may be possible to factor in the extent to which recovery rates generated after the term of the portfolio has expired are distributed to the investors.

Qualitative Analysis – Issue Rating

If the portfolio is issued, EHR assigns an issue rating on the basis of the credit portfolio rating. In accordance with our Issue Rating Methodology, which is available on our website, it is fundamentally possible for an issue rating to differ from the credit portfolio rating. In particular, the issue rating factors in the structure of creditor protection rights.

Euler Hermes Rating GmbH

Stadthausbrücke 5
20355 Hamburg
Tel.: +49 (0) 40/60 77 812-00
Fax: +49 (0) 40/60 77 812-49
Website: www.ehrg.de
E-mail: info@eulerhermes-rating.com

Disclaimer

CREDIT RATINGS ISSUED BY EHRG ARE EHRG'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND EHRG'S PUBLICATIONS MAY INCLUDE EHRG'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. EHRG DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND, IN THE CASE OF ISSUANCE-LEVEL CREDIT RATINGS, ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND EHRG'S OPINIONS INCLUDED IN EHRG'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. CREDIT RATINGS AND EHRG'S PUBLICATIONS ARE NEITHER A PROSPECTUS NOR A SUBSTITUTE FOR INFORMATION ASSEMBLED AND PRESENTED BY COMPANIES OR ISSUERS FOR INVESTORS REGARDING THE PURCHASE OF A SECURITY OR FOR ASSESSING THE CREDITWORTHINESS OF A RATED ENTITY. CREDIT RATINGS AND EHRG'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR EHRG'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. EHRG ISSUES ITS CREDIT RATINGS AND PUBLISHES ITS PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, CONDUCT ITS OWN INDEPENDENT ANALYSES, CREDIT ASSESSMENTS AND OTHER VERIFICATIONS AND EVALUATIONS OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

EHRG'S CREDIT RATINGS AND EHRG'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE EHRG'S CREDIT RATINGS OR EHRG'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

All information contained herein is obtained by EHRG from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. EHRG adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources EHRG considers to be reliable including, when appropriate, independent third-party sources. However, EHRG is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the EHRG publications.

Please note that summaries of contracts, laws and other documents contained in any EHRG publication, rating report or other materials cannot replace careful study of the relevant complete texts.

EHRG and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if EHRG or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by EHRG. The limitations do not apply to the extent that fraud, intent or any other type of liability cannot be excluded and/or limited under applicable law.

EHRG and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, on the part of, or any contingency within or beyond the control of, EHRG or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information. The limitations do not apply to the extent that fraud, intent or any other type of liability cannot be excluded and/or limited under applicable law.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY EHRG IN ANY FORM OR MANNER WHATSOEVER.

The dissemination and use of an EHRG rating report may be prohibited by law in certain jurisdictions. Any persons who come into the possession of such information should inquire about and comply with any prohibitions that may be in place. EHRG assumes no liability of any kind with respect to such dissemination and use of any rating in any jurisdiction whatsoever.

Euler Hermes Rating GmbH