

Creditreform Rating AG Rating Methodology

Covered Bond Ratings

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Version 1.3

Creditreform 
Rating

Table of Content

1	INTRODUCTION	4
2	SCOPE OF APPLICATION	4
3	RATING METHODOLOGY	5
3.1	RATING APPROACH	5
3.1.1	<i>Risk factors in covered bond ratings</i>	5
3.1.2	<i>Notching framework</i>	5
3.2	ISSUER-RELATED RISKS	7
3.3	STRUCTURAL RISK	8
3.3.1	<i>Legal and regulatory framework</i>	8
3.3.2	<i>Transaction structure</i>	10
3.3.3	<i>External Support</i>	10
3.4	LIQUIDITY- AND REFINANCING RISK	10
3.4.1	<i>Legal OC and liquidity requirements</i>	11
3.4.2	<i>Short-term liquidity coverage</i>	11
3.4.3	<i>Asset-liability mismatches</i>	11
3.4.4	<i>Other liquidity risks</i>	13
3.5	CREDIT- AND PORTFOLIO RISK	13
3.5.1	<i>Cover pool asset analysis</i>	13
3.5.2	<i>OC and credit enhancements</i>	13
3.5.3	<i>Interest- and FX risk</i>	14
3.5.4	<i>Modelling approach and assumptions</i>	15
3.6	CASH FLOW MODEL	15
3.6.1	<i>Cash flow model assumptions</i>	15
3.6.2	<i>Rating scenarios</i>	16
3.6.3	<i>Break-even OC analysis</i>	16
3.7	SENSITIVITY ANALYSIS	17
3.8	COUNTERPARTY RISK	17
4	ENVIRONMENTAL, SOCIAL AND GOVERNANCE FACTORS FOR COVERED BONDS	18
5	MONITORING AND SURVEILLANCE REPORTS	18
5.1	MONITORING	18
5.2	SURVEILLANCE REPORTS	19
6	APPENDIX I: INTEREST RATES AND FOREIGN CURRENCY STRESS	19
6.1	INTEREST RATE RISK MODELING	19
6.2	FOREIGN CURRENCY RISK MODELING	20
7	APPENDIX II: MODELING APPROACH OF MORTGAGE COLLATERAL	21
7.1	PORTFOLIO DEFAULT DISTRIBUTION	21
7.2	PORTFOLIO RECOVERY RATES	22
8	APPENDIX III: MODELING APPROACH OF PUBLIC SECTOR COLLATERAL	22
8.1	PORTFOLIO DEFAULT DISTRIBUTION	22
8.2	PORTFOLIO RECOVERY RATES	23
9	APPENDIX IV: NOTCHING APPROACH FOR PRIMARY RATING UPLIFT	23

This document version 1.3 is an update, preserving the original methodology. We have clarified certain statements, divided sections into sub-sections, and added annexes for detailed technical explanations. These revisions do not affect current ratings.

1 Introduction

In this document, Creditreform Rating AG ("Creditreform Rating" or "CRA") discloses its rating methodology for the rating of covered bonds in order to provide the parties involved, investors and the wider public with the opportunity of developing a deeper understanding of the mechanisms behind its ratings. This document will be updated regularly to reflect any changes in our methodology and approach. The CRA rating methodology and Code of Conduct can be freely accessed on our web page (www.creditreform-rating.de).

2 Scope of application

The CRA "Rating of Covered Bonds" rating methodology serves as a general framework for the rating of covered bond programs. These ratings are carried out taking into account all available and relevant information in order to quantify the risks of the issue in question, using a rating methodology that combines both quantitative and qualitative approaches. Specific jurisdiction- and program-specific extensions and modifications of the rating approach outlined here will be based on an evaluation of relevant facts (i.e. legal framework assessment, asset-classes, cover pool analysis, structural features etc.) and will be referenced in a particular rating report.

Covered bonds are dual-recourse instruments. Timely and full payment of interest and principal is typically secured by reference to (1) the issuer of the program, and (2) a pool of cover assets, both serving as alternative sources of funding. As they are typically exempt from bail-in, covered bonds benefit from enhanced protection against financial distress of the issuer, offering covered bond holders a preferential claim over cover pool assets as well as a residual claim on the issuer's insolvency estate. This preferential treatment of covered bonds is typically encoded in national and/or supra-national legislation.

The terms "issuer" and "covered bond issuer" refer to a financial institution that sponsors a covered bond program, although the actual issuer may be a special-purpose entity ("SPE") or a specialized lender, for example. However, in this case, any reference to a "rating on an issuer" reflects the creditworthiness of the actual issuer, which incorporates any group support from the sponsor.

Additionally, covered bond ratings represent well-informed assessments of an issue's credit quality. They do not represent a recommendation to purchase, sell or hold financial instruments. Neither are they legal opinions, and they provide no independent valuation of the future market values of individual assets and / or investments in the issuer's possession.

3 Rating methodology

3.1 Rating approach

3.1.1 Risk factors in covered bond ratings

A CRA covered bond rating is based on the analysis of several risk domains typically associated with the issuance of covered bonds: (1) issuer risk, (2) structural risk, (3) liquidity- and refinancing risk, (4) credit- and portfolio risk, (5) analysis of cash flows, (6) counterparty risk.

The starting point of the CRA covered bond rating is the assessment of issuer-related risks. In particular, our assessment of the issuer's credit quality – its capacity to service covered bond debts as a going-concern – will serve as a rating floor to the covered bond rating and likewise indicate the need for recourse to structural safeguards and the cover pool.

The analysis of the legal and regulatory framework for covered bonds of a particular jurisdiction and the transaction structure laid down in the contractual documents provide an insight into the structural risks of the covered bond program. In analyzing liquidity- and refinancing risk, we assess whether the liquidity requirements of a covered bond program are likely to be met, including the servicing of interest and principal of the issued covered bonds.

We scrutinize the credit quality and cash flow characteristics of the cover pool assets, which includes an assessment of asset credit risks, i.e. deriving assumptions of default probability and recovery prospects, in order to delineate whether available collateral can be monetized at stressed market prices during adverse economic conditions to pay maturing covered bonds. These results will feed into our cash flow model, which we use to test the structure's ability to perform and service the covered bonds in particular rating stress scenarios.

Other risks, in particular with respect to counterparties will be taken into account in the final rating. The identification of significant counterparty risk may also provide reasons to deviate from the combined uplift determined in the preceding stages.

3.1.2 Notching framework

Our assessment of issuer-related risks defines a covered bond rating floor and the basis for two rating uplifts, which reflect the regulatory structure and the quality of the cover pool as a second recourse. In Europe, we consider the respective legal framework and dedicated covered bond legislation present in most jurisdictions an important driver and mitigating factor of transaction-related risks.

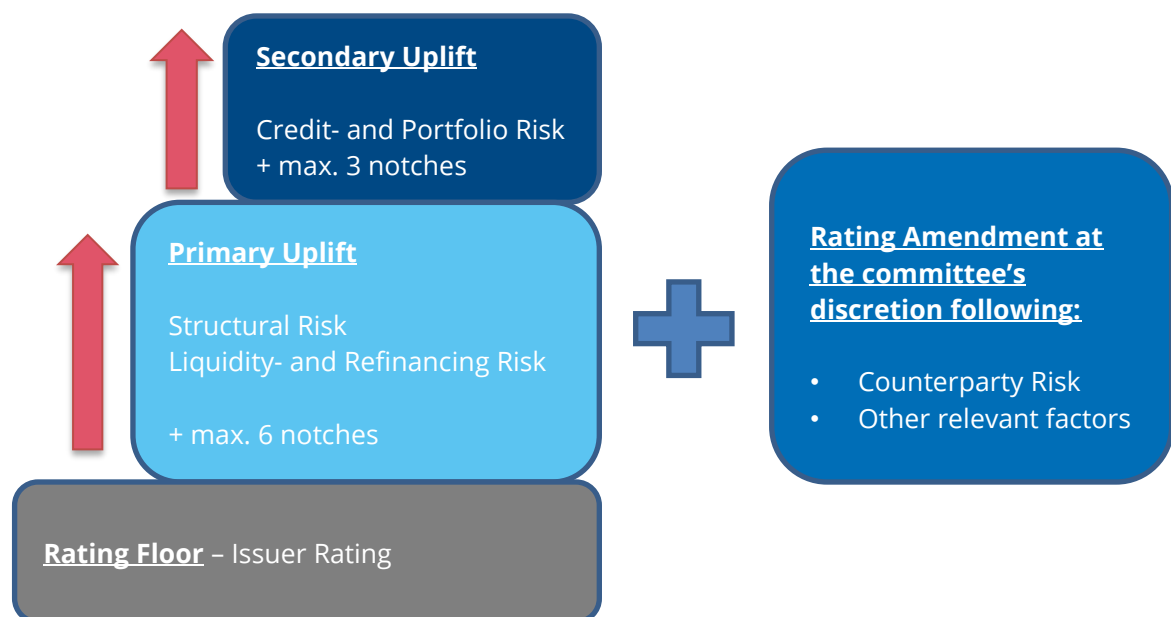
The protection level provided by legal and regulatory frameworks is reflected in **the primary uplift of up to six notches** above the issuer rating. To determine the primary uplift, CRA uses a scoring system to evaluate

the strength and weaknesses of the relevant legislative framework(s) with respect to structural risks and effectiveness in mitigating liquidity- and refinancing risks.

The items of this analysis are strongly aligned with the EBA Report on covered bonds¹, assessing several components of structural risks for a maximum uplift of +4 notches, and liquidity and refinancing risk for a maximum uplift of +2 notches. However, CRA may use other relevant factors and analyst discretion, if necessary. The assessment approach for determining the primary rating uplift are elaborated in “Appendix IV: Notching approach for primary rating uplift”.

The secondary uplift, up to three notches, considers the collateral and cover pool quality. The rating levels, stress factors, and multipliers relevant to credit and portfolio risk assessment are measured relative to the intermediate covered bond rating, including the primary uplift.

The final rating incorporates qualitative and quantitative analyses and counterparty risks relevant to the transaction. It is subject to the rating committee's decision, which can amend the rating to include additional relevant factors.



¹ EBA Report on Covered Bonds Recommendations on Harmonisation of Covered Bond Frameworks in the EU EBA-Op-2016-23 | 20 December 2016

3.2 Issuer-related risks

In our rating of covered bonds, the issuer's long-term rating, i.e. the creditworthiness of the issuer, is an authoritative reference point serving as a rating floor. Generally, CRA only assesses the ratings of covered bonds of issuers for which it maintains a long-term rating or for which a reference long-term rating can be determined based on the basis of expected support or guarantees. However, if the issuer has no long-term rating but the parent company does, CRA may use the parent rating as a rating reference point.

This refers primarily to SPE-covered bond issuance set-ups (e.g. France, Italy, or Netherlands) and issuances of subsidiaries in a group of companies. We evaluate whether the issuer is fully owned or the probability is very high that the issuer is supported by the parent company in the event of payment difficulties. The probability of support may depend on a variety of factors, including a common regulatory framework, agreements on profit and loss transfers, guarantees, a uniform branding and interdependency in the business model or refinancing. Therefore, we analyze to what extent the issuer-related risk of an SPE or subsidiary can be equated with that of the group.

The issuer long-term rating also includes an assessment of issuer-related operational risks. This includes the issuer's role in setting and maintaining lending standards, managing the cover pool, influencing asset-liability mismatches, and setting the overcollateralization level beyond legal or contractual obligations. The issuer should have risk management systems to identify and control the relevant risks such as interest rate-, currency and market price risks, or operational and liquidity risks.

The issuer should also have the discretion to mitigate negative changes without violating covered bond legislation or contractual commitments, such as by adding lower-quality assets to the cover pool or altering hedging contracts. As the issuer typically services the underlying loans, the presence of a backup servicer is viewed positively by CRA, as it reduces payment interruption risk following issuer default and transition to the second recourse.

The rating outlook of the issuer long-term rating may be relevant for the assessment of the covered bond rating outlook if no notching buffer² against a potential downgrade of the issuer rating becomes apparent from the analysis of the primary and secondary uplift.

For a detailed representation of the issuer rating, see the Creditreform Rating bank rating methodology, available on our website (www.creditreform-rating.de).

² A notching buffer occurs if the full primary and/or secondary uplift are not necessary to achieve the best possible rating (e.g. AAA).

3.3 Structural risk

3.3.1 Legal and regulatory framework

Our analysis of structural risks focuses on the legal and regulatory framework governing the issuance of covered bonds in a respective jurisdiction. To be eligible for a rating uplift, we expect a number of requirements to be addressed by legislation and/or the covered bond program as described below.

In most European countries, specialized covered bond frameworks have been introduced and further harmonized by the EU Covered Bond Directive ("CBD")³, which came into force in July 2022 at the latest. Additionally, national regulations are typically complemented by relevant EU-wide legislation such as the Bank Recovery and Resolution Directive ("BRRD")⁴, which establishes a framework for the recovery and resolution of credit institutions and investment companies. If such dedicated covered bond legislation does not exist, or if the issuer issues outside of the existing legal framework, our analysis focuses on the particular contractual arrangements agreed upon between the transaction parties.

Covered bond frameworks and legislations are constantly subject to amending directives, therefore, the analysis of the legal and regulatory framework in the rating process and monitoring is subject to continuous analysis.

3.3.1.1 Asset segregation

A key aspect in the legal framework analysis is the effective segregation of cover pool assets from the issuer's insolvency estate, which is a structural prerequisite to uninterrupted payments of interest and principal after a default of the issuer from the cover pool. The isolation of cover pool assets must be legally valid, binding and enforceable.

Among the legal provisions, we assess the nature and effectiveness of asset segregation and whether cover pool assets will be used exclusively to service covered bonds or other obligations of the issuer with the same rank. Of particular interest is the existence of statutory provisions regarding the going-concern status of the covered bonds upon regulatory intervention and whether or not covered bonds will be accelerated following a default. To further assess the bankruptcy remoteness of the program, we address how claims of the covered bond holders are protected against claims from other creditors (i.e. preferential claim by law, true-sale etc.) and whether covered bond holders will have recourse on the insolvency estate of the issuer upon a cover pool default. *Vice versa*, other creditors may exercise claims on cover assets that exceed the regulatory overcollateralization requirements of the cover pool and, in the event of an issuer default, these may have to be released into the insolvency estate of the issuer.

³ Amending Directive 2019/2162/EU of the European Parliament and of the council of 27 November 2019

⁴ Bank Recovery and Resolution Directive 2014/59/EU of the European Parliament and of the council of 15 May 2014.

3.3.1.2 *Cover pool requirements*

To ensure that high credit quality assets are included and maintained in the cover pool, covered bonds can only be backed with collateral meeting certain eligibility criteria. For example, legislation may limit permissible collateral assets to real estate mortgages, sovereign credits or certain types of other assets (i.e. ship or aircraft loans). The eligibility criteria of the cover pool as mandated by the legal and regulatory frameworks may include, among others:

- a. Permissible assets and types of covered bonds allowed
- b. Limitation to a single primary cover asset
- c. Geographical limits of cover assets
- d. Percentage of foreign assets
- e. Type and level of LTV value limits and their determination
- f. Valuation requirements
- g. Type and extent of substitute assets
- h. Limits of program size

A special administrator and/or cover pool monitor may be appointed by the regulatory body or the issuer and required to act as an independent fiduciary agent taking certain responsibilities. This includes, for example, ensuring proper registration of cover assets, verifying valuations in line with technical standards and ensuring compliance with coverage and OC requirements. Rules regarding the management of the cover pool may also include the treatment of non-eligible assets, the mode of removal of (non-performing or ineligible) assets from the pool and provisions for the use of derivatives and hedge and their treatment in the case of default. Such provisions may explicitly differentiate between the management of the cover pool while a going-concern and after default.

3.3.1.3 *Disclosure requirements*

Covered bond issuers should disclose aggregated data on the covered bond program and the cover pool assets to a sufficient extent and frequency. A high level of transparency helps to ensure compliance with the legal or regulatory framework, to demonstrate good governance practices and to avoid information asymmetries. CRA expects the issuer to provide, inter alia, information on the credit and liquidity risk characteristics of the cover assets and the covered bonds, as well as information on the counterparties, at least on a quarterly basis.

3.3.2 Transaction structure

In the case of non-regulated covered bonds, contractual features are often designed to achieve similar enhancements as provided by the prevalent legal frameworks. These may include mandatory OC, eligibility criteria, cover pool management provisions (monitor and trustee, removal of delinquent assets, derivatives, coverage tests etc.), maturity extensions and reserves, as well as LTV and valuation requirements. CRA will assess individual program features both in absolute terms and benchmarked against comparable peer-group programs when appropriate to judge their appropriateness in mitigating credit- and refinancing risk and providing a contractual framework that effectively protects bondholders and ensures a high credit quality of the covered bonds.

3.3.3 External Support

Creditreform Rating assesses the potential for receiving external support following a default of the issuer, in which case the program would have to turn to other sources to meet its obligations and mitigate refinancing risk. Generally, we expect external support for a program to increase with moderate to high systemic relevance, i.e. if the costs of a program's failure to the economy and the financial system would outweigh the cost of providing support.

The systemic relevance of a covered bond market will be sized relative to the economy, and we also take into account the specific program size. External stakeholder support may be provided by governments and central banks or through other private sector support mechanisms (i.e. secondary market liquidity). CRA assesses the likelihood of external liquidity injection and support for troubled issuers to service their covered bonds while a going-concern, as well as liquidity support to the program after the default of an issuer.

3.4 Liquidity- and refinancing risk

In the event of an issuer default, and upon transitioning to the second recourse, liquidity and refinancing risks pose a threat to the stability of the covered bond program. In particular, while the issuer remains operational, liquidity- and refinancing requirements are usually covered by the issuer in tapping its own funding sources to address:

- a. the refinancing of larger funding gaps resulting from asset-liability mismatches, and
- b. short-term liquidity needs, i.e. the ongoing coverage of interest and senior costs

In our analysis of liquidity- and refinancing risk, we assess the extent to which the requirements for legal overcollateralization (OC) and liquidity support, and the particular transaction structure, in conjunction with the current cover pool profile, facilitate the timely payment of interest and principal in a scenario where the issuer is assumed to be in default. The result determines the primary uplift on the covered bond rating from

the rating floor and influences the extent and amount of refinancing- and liquidity risk we incorporate in the quantitative modelling stage.

3.4.1 Legal OC and liquidity requirements

We analyze legal OC and liquidity requirements for their ability to effectively mitigate credit and liquidity risks. In order to mitigate credit risk, covered bond frameworks usually foresee detailed requirements in respect of amount and type of OC and the frequency and type of cover test applied (nominal, net present value). At times, the issuer may be allowed to commit OC in excess of the legally required minimum and covered bond holders may be given priority to excessive OC, which then need not be returned to the insolvency estate of the issuer upon default.

3.4.2 Short-term liquidity coverage

The coverage of liquidity needs to avoid payment interruptions is often addressed structurally, through reserves, credit lines and external support or other mechanisms stipulated by the legal and regulatory framework. Covered bond programs often benefit from a mandatory liquidity reserve to cover a number of months of liquidity, which may also include the coverage of principal payments and usually need to be tested regularly (“pre-maturity test”). Where the legislative framework does not require coverage, the issuer may decide contractually or *via* a public statement to maintain the same, in which case we base our assessment on an appropriate track record that demonstrates a credible history of commitment to contractual obligations. Without these safeguards, we consider short-term liquidity risks increased, which may lead to a lower primary rating uplift.

3.4.3 Asset-liability mismatches

Assets of the cover pool often amortize over a time horizon that is beyond the scheduled maturity of the covered bonds, resulting in asset-liability mismatches. After the default of the issuer, ALM risks pose a major threat to the timely payment of principal. CRA analyses the interplay of legal and regulatory provisions and specific structural features of the covered bond program to understand the effective nature of the ALM, which may change upon the failure of the issuer (i.e. due to conditional acceleration of covered bond redemptions, soft-bullet or pass-through structures etc.). If provisions fail to mitigate ALM risks, the covered bond program, through its trustee, may need to access capital markets for external funding or liquidate cover assets to fill ALM funding gaps.

3.4.3.1 *Pre-maturity tests and matching*

Issuers may be required to prefund the covered bond principal redemptions coming due in a given period (“pre-maturity test”), for example 180 days or 12 months. Such coverage tests will need to be carried out on a regular basis and issuers are normally required to have sufficient liquid assets to cover any potential shortfall.

Typically, matching mechanisms mandate the coverage of the covered bonds' nominal and/or net-present-value and excess overcollateralization, including the method and frequency of coverage testing. We do not consider natural matching as fully effective in mitigating ALM risks unless it requires efficient cash flow matching, which is not a requirement in all covered bond jurisdictions.

3.4.3.2 *Repayment method*

Covered bonds typically amortize in bullet-like structures. However, the method of repayment may differ among covered bond programs and the legal provisions guiding their issuance.

- a. With a hard-bullet structure, any unmet cash flow requirement at maturity results in an immediate default of the notes, posing the highest risk of loss to investors if the issuer is not a going-concern. The cover pool in hard-bullet structures will typically consist of a higher share of liquid assets, also implying higher costs of carry to the issuer.
- b. Soft-bullet structures permit an extension period (typically 12 months) beyond the maturity date, extending the final maturity. This allows the covered bond program manager (or the trustee in case of issuer default) to collect further installments and manage the sale of cover assets more efficiently, reducing the risk of inefficient monetization, "fire-sale", and potential losses to investors.
- c. Conditional pass through ("CPT") structures are designed such that, if the notes cannot be serviced and repaid as of the predefined schedule, then the final maturity date will be determined by the longest-lived assets of the cover pool, including potential workouts. Investors will be allocated pro-rata the available proceeds from the cover assets. In our opinion, CPT structures can efficiently mitigate refinancing risk, as the possibility of an event of default due to asset-liability mismatches and a failure of principal repayment is completely mitigated.

Covered bond programs may also be designed or legally required to accelerate the repayment of covered bond principal conditional on an issuer default or an extension of the program. In this case, the amortization of the covered bonds will begin immediately using available liquidity according to a pre-defined waterfall.

3.4.3.3 *Refinancing costs*

In the event of the issuer's insolvency, the legal frameworks might stipulate that the special administrator can sell assets of the cover pool or use them as a guarantee for liquidity operations if liquidity shortfalls are anticipated. Typically, CRA considers the sale of cover assets the issuer's primary route to addressing unmitigated refinancing risks and assume a fire-sale discount on the nominal value, which we measure depending on our assessment of the relevant markets (see "Cash flow model assumptions"). In the case of a sale of cover pool assets to meet financial obligations, the cover pool administrator will need to find a buyer or sell in the secondary market part of the cover pool assets to overcome temporary refinancing requirements.

3.4.4 Other liquidity risks

CRA checks if the respective legal framework provides for stress tests to be conducted on interest rate- and foreign currency on a regular basis as well as the use of derivatives as an additional measures to mitigate market risks. Additionally, a number of other events may pose a threat to liquidity and will be assessed by the CRA during the rating process. These may include, for example, payment interruptions following an issuer default while the special administrator takes over the management of the pool; uncertainty with respect to the effectiveness of legal provisions to protect liquidity if these have not been tested in court; and counterparty risks such as the default or termination of swaps (also see “Counterparty risk”).

3.5 Credit- and portfolio risk

3.5.1 Cover pool asset analysis

We elicit the credit risk profile of the cover pool to understand the performance of the cover pool assets in full detail. This typically entails the calculation of the expected loss of the portfolio over its life by combining asset-specific loss- and recovery assumptions and their timing. Thus, we seek to understand the collateral characteristics that shape the magnitude and pattern of defaults and loss severities. A number of quantitative parameters of portfolio are derived from data, such as its asset-liability profile, its granularity, levels of prepayments, credit enhancements such as LTVs/LTRs and available OC, exposure to interest and FX risk, delinquency rates, seasoning and remaining terms, type and amount of substitute and foreign assets, servicer and other third-party costs, etc. CRA will use all information available (including monitoring reports, if available) and may make reasonable assumptions based on further quantitative research in particular instances where information is (partly) unavailable. The results – rating-specific assumptions about defaults, recoveries and corresponding expected losses – then serve as input to our cash flow model, in which we test rating-specific loss assumptions and stress scenarios.

Cover pool assets generally comprise mortgage (residential and/or commercial) loans or public-sector assets. Details on our specific modeling approaches for rating covered bond programs can be found in the “Modelling approach and assumptions” section.

3.5.2 OC and credit enhancements

The level of available OC is an important mechanism supporting the secondary rating uplift. As it may vary with the amount of covered bonds issued or amortized and assets being added or removed, it is typically actively managed by the issuer to support and maintain a high level of credit support. While the issuer is obliged only to provide a level of OC that satisfies regulatory tests and maintains the minimum legal or contractual level of OC, issuers often commit to a higher level of OC to further mitigate credit risk and support higher ratings. CRA may take into account such voluntary excess OC if the legal analysis indicates that it will be available to covered bond holders in the event of a default and switch to the second recourse. In general,

the likelihood that a certain level of OC will be stable over time depends on the nature of the commitment and its legal binding strength.

We typically observe the historical volatility of available OC, assuming that issuers with a regular issuance practice and high-level issuer ratings have a strong incentive to maintain stable and predictable OC management policies. Conversely, issuers with low or declining issuer ratings may prioritize maintaining legal minimum OC requirements over additional commitments and rating support, exercising their management discretion to target lower OC levels and remain eligible for access to central bank funding. However, if the voluntary nominal OC shows highly volatile characteristics that could have a significant impact on the final rating, CRA may also consider historical OC levels and their developments.

While we consider the current overcollateralization (OC) level for investment-grade issuers, we may apply forward-looking downward adjustments to OC levels for non-investment grade issuers or those with a negative outlook, where we expect a change of OC management policy, and refer to the legal minimum OC in the absence of binding contractual agreements.

CRA will factor in additional credit enhancement mechanisms pertaining to a particular covered bond program in the determination of credit- and portfolio risk, such as credit facilities, insurances or hedging instruments, or guarantees.

3.5.3 Interest- and FX risk

The cash flows available to covered bonds may be sensitive to movements in interest rates or foreign exchange quotes. Interest rate and currency mismatches typically arise when cover pool assets and covered bonds have different interest rates, durations, or currency denominations. FX risks emerge with currency mismatches between covered bond assets and liabilities and may lead to a reduction of available cash flows. Movements on interest rates can pose a risk when significant differences between assets and covered bonds exist, either because of a fixed vs. floating mismatch or because of duration gaps between assets and liabilities. Depending on the particular conditions, interest rate risks will materialize in rising or falling interest rate environments.

CRA will assess stress scenarios by taking into consideration particular parameters (e.g. specific curve tenors, or FX volatility) and will base its analysis on prudent assumptions concerning stressed movements in interest and FX rates to incorporate the results in its cash flow model. The FX and interest rate risk breakdown serves to enhance the cash flow model by providing a consistent analysis to appraise economic stress events. The assessment approaches for Interest rates and FX stresses are presented in "Appendix I: Interest rates and foreign currency stress".

3.5.4 Modelling approach and assumptions

The aim of credit- and portfolio risk analysis is to derive rating-level specific loss assumptions, which can be incorporated into the cash flow model. We apply rating-level stressed parameters to our proprietary cash flow model with a first euro loss definition, meaning that a default for a specific rating scenario occurs when interest and principal payments are not made in full as contractually defined.

The scenario-specific default and recovery rates are computed by applying stress multiples or haircuts. The Rating Default Rate (“RDR”) can be defined as the weighted average of the cumulative default rate of cover assets over their lifetime in a given rating scenario. The Rating Recovery Rate (“RRR”) is the weighted average recovery rate of the defaulted assets in a given rating scenario. The rating specific expected loss rate (“RLR”), a key target parameter to be used in the cash flow model, is then typically derived for a given rating-scenario S using the formula **$RLR_s = RDR_s \times (1 - RRR_s)$** .

Depending on the type of asset and pool parameters, Creditreform Rating will apply different modeling techniques to derive the required inputs. For granular mortgage-backed cover pools, CRA uses the modeling approach described in “Appendix II: Modeling approach of mortgage collateral”. For less granular public sector cover assets, the modelling approach described in “Appendix III: Modeling approach of public sector collateral” is used.

3.6 Cash flow model

3.6.1 Cash flow model assumptions

The CRA cash flow analysis is designed to determine whether the cash flows from the cover pool assets are sufficient to pay interest and principal to the covered bond holders in full and on time once recourse to the cover assets has been enforced and the issuer, which is no longer a going-concern, ceases to provide liquidity to the program. We typically assume an immediate default of the issuer at the cut-off date and do not take into account any future issuance of covered bonds.

Our cash-flow analyses look at various factors such as the maturity structure of the covered bonds, available OC, liquidity reserves, derivatives and other credit enhancements, among others. We apply the rating-level specific stresses and expected loss from credit risk analysis in order to derive stressed cash flows corresponding to the rating level that represents the feasible secondary uplift up to a maximum of three notches.

3.6.1.1 *Asset-liability structure*

The model considers the covered bond asset-liability structure, i.e. cash flows from cover pool assets versus outstanding payments on covered bonds. Particular attention is given to the maturity structure of the covered bonds, whether hard-bullet, soft-bullet or pass through, and the extended maturities are considered

accordingly in our cash flow analysis, where applicable. However, if the available public data or data provided deem insufficient to quantify the maturity structures of the covered bonds, CRA may consider this feature of the covered bond program qualitatively in its rating analysis.

3.6.1.2 *Asset sale discount*

CRA assumes that short-term liquidity needs and liquidity needs arising from asset-liability mismatches will be met through the sale of cover assets available for monetization. Therefore, we apply a rating-level haircut on the asset value which represents additional costs of disposal and market risks during the sale of cover assets. We assume that assets will be sold at a discount to nominal value and estimate this discount on the basis of observable (historical) market value spreads, i.e. secondary market RMBS spreads, CB secondary market spreads and spreads on comparable and relevant securities and other indicative selling prices of similar assets, if available, stressed to the tested rating-levels and including reasonable cost assumptions.

Additionally, cover assets often have positive yield spreads over the covered bonds issued. We therefore use available public information (e.g. issuers' financial statements) to determine these assumed spreads and include them in our cash-flow analysis. Our cash-flow model also includes liquidity support mechanisms such as reserves that may be used to bridge short-term funding requirements of the covered bond program. If credit lines exist which the covered bond program might tap, our counterparty risk assessment will determine the risk associated with the (non-) availability of such resources (see "Counterparty risk").

3.6.2 Rating scenarios

We then assess if the cover pool, with available credit enhancements, can service all covered bonds in the given rating scenario, thereby determining the maximum secondary uplift. The rating scenarios are evaluated considering key input parameters such as:

- a. Portfolio composition (diversification, concentration, granularity)
- b. Probability of default of cover assets
- c. Correlations of cover assets and systematic risk factors
- d. Recoveries
- e. Maturity profile of covered bonds and cover assets (ALM)

3.6.3 Break-even OC analysis

CRA also performs a break-even OC analysis of the covered bond program. The scope of such test is to assess whether these OC levels can withstand the corresponding losses for a given rating scenario. When performing break-even OC analysis, rating-specific stress scenarios are taken into account. Since covered bond program nominal/ voluntary OC levels are dynamic and the parameters that determine break-even OCs change over

time, the rating specific break-even OCs are subject to change over time, which is reflected in our monitoring/rating update reports. Major determinants of the analysis are:

- a. Asset liability mismatches
- b. Loss levels
- c. Interest rate spreads
- d. Foreign currency mismatches
- e. Recoveries

3.7 Sensitivity analysis

We use information from the rating process to perform sensitivity analyses on key cash flow model parameters. This enables scenario-based stress testing, where the cash flow model, in the context of a particular rating scenario, is subjected to a predetermined additional stress, and the effect on the resilience of the structure is examined. Sensitivity analyses are used to study the extent to which the stability of the structure is subject to change due to variations in input parameters. This enables an assessment of the effects of uncertainty and risk related to the input parameters and the resulting changes in the rating indications of the issue. Besides stress factors impacting the relevant loss rate, we can also examine other parameters for their influence on the resilience and final repayment of the covered bond tranches:

- a. Level of default and recovery rates, loss rates
- b. Level and timing of prepayments
- c. Timing of defaults and recoveries
- d. Interest rates and FX quotes
- e. Portfolio yield (excess spread)

In order to determine a rating indication for a tranche, the predefined scenarios are evaluated. CRA checks whether the claims of creditors to payment of interest and principal can be fulfilled in accordance with contractual obligations.

3.8 Counterparty risk

The analysis of counterparty risks focuses on key transaction parties involved and an assessment of their capabilities in managing a covered bond program according to the terms and conditions of their mandate. Counterparty risks reflect the financial strength and professional experience of parties vital to the performance of the reviewed transaction. CRA assesses to what extent counterparty risks could affect the issue's future performance. For example, risks might arise through the provision of derivatives, credit lines

and financial guarantees. Should the issuer go bankrupt, there is also a risk that funds may not be returned and will be commingled with the insolvency estate of the issuer (“commingling risk”).

CRA therefore assesses the creditworthiness and experience of the swap counterparties, guarantors, collateral providers, account-banks and trustees. CRA examines all dependencies with regard to such parties involved. The solvency and credit quality of parties involved in the transaction are therefore reviewed in the context of the rating process and will be appropriately factored into the rating.

4 Environmental, social and governance factors for covered bonds

CRA generally takes ESG-relevant factors (environmental, social and governance) into account when assessing Covered Bond ratings. CRA assumes that an isolated consideration and presentation leads to further transparency and greater granularity of information.

While issuer-relevant ESG factors are already included in the issuer long-term rating based on the analysis of the non-financial factors such as environmental, social and governance of banks with regard to its sustainability, for covered bond ratings we mainly take into account relevant aspects of the covered bond programs, the underlying legal framework and cover pool-specific ESG factors. Considering this, CRA assesses governance factors in particular as significant for the assessment of covered bond ratings.

On the subject of ESG (environment, social and governance), Creditreform Rating AG has published the basic document “The Impact of ESG Factors on Credit Ratings”. This document and the rating methodology related to the issuer-relevant ESG factors are readily available on our website. (www.creditreform-rating.de).

5 Monitoring and surveillance reports

5.1 Monitoring

A monitoring process is usually carried out on a quarterly basis. For this purpose, we use a specific tool that covers the monitoring analyses of the rating floor, the primary uplift, and the secondary uplift. During this process, the credit metrics are usually not updated, but rather tested in the cash flow model if necessary (for some ratings, the cash flow analysis may have no influence on the final rating proposal). The issuer rating is also subject to changes during the monitoring process. Given the dual nature of covered bonds (i.e., cover pool assessment and issuer rating) and assuming a constant legal and regulatory framework⁵, we apply our

⁵ Significant changes in the frameworks might lead to changes in the country's framework assessment, and in turn possible impact on the final covered bond program rating.

internal criteria for potential changes in the issuer rating and cover pool rating during monitoring phases. A comprehensive rating review is conducted annually.

For unsolicited ratings, we use public information, primarily from the issuer's website, for our monitoring process. Our analysts maintain direct contact with relevant transaction parties while evaluating information. If significant events occur during monitoring that impact the issue's quality, either negatively or positively, we adjust the rating.

5.2 Surveillance reports

Apart from the continuous monitoring, CRA also publishes quarterly surveillance reports for ECB relevant covered bond ratings (part of the ECB requirements for covered bond ratings). CRA uses the quarterly information provided by the issuer and other publicly available information to prepare the surveillance reports. The minimum disclosure criteria for the surveillance reports are complied with in accordance with the information requirements set out in Annex IXb of the General Documentation of Eurosystem's disclosure requirements⁶.

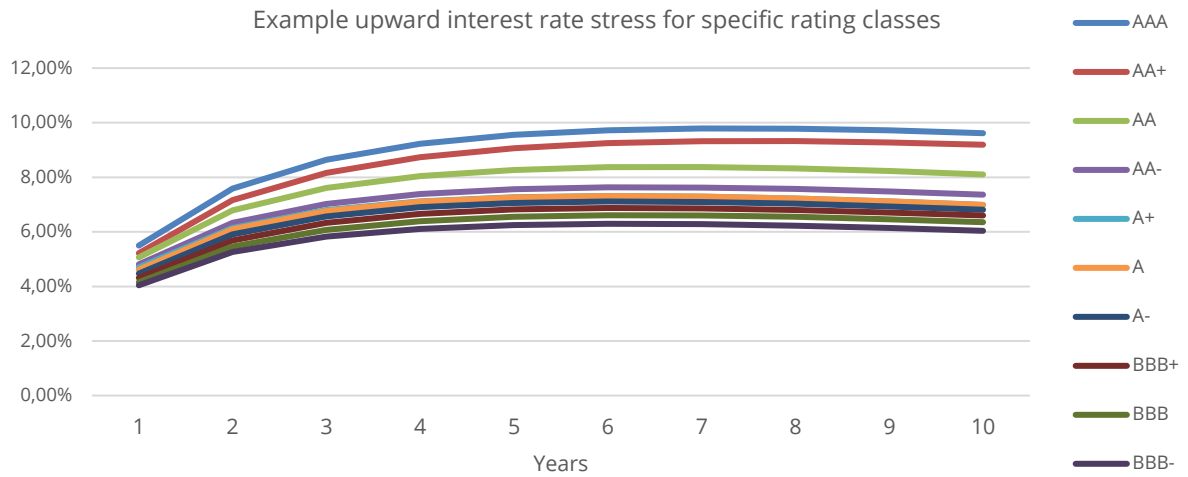
6 Appendix I: Interest rates and foreign currency stress

6.1 Interest rate risk modeling

CRA uses deterministic and/or stochastic approaches to assess interest rate risks by stressing the interest rate term structure, taking historical volatility into account. The starting point of the analysis is the historical evolution of forward rate curves, typically EURIBOR rates. We then apply a stochastic model to forecast future developments of interest rates for upward and downward scenarios and for specific time horizons. Market spot rates are dynamic and updated regularly, so the CRA closely monitor the evolution of interest rates on a regular basis and updates its rating specific interest rates stress scenarios.

⁶ Guideline (EU) 2015/510 of the European Central Bank of 19 December 2014 on the implementation of the Eurosystem monetary policy framework (General Documentation Guideline) (ECB/2014/60)

Figure 1: Example upward interest rates stress over time for specific rating class | Source: CRA

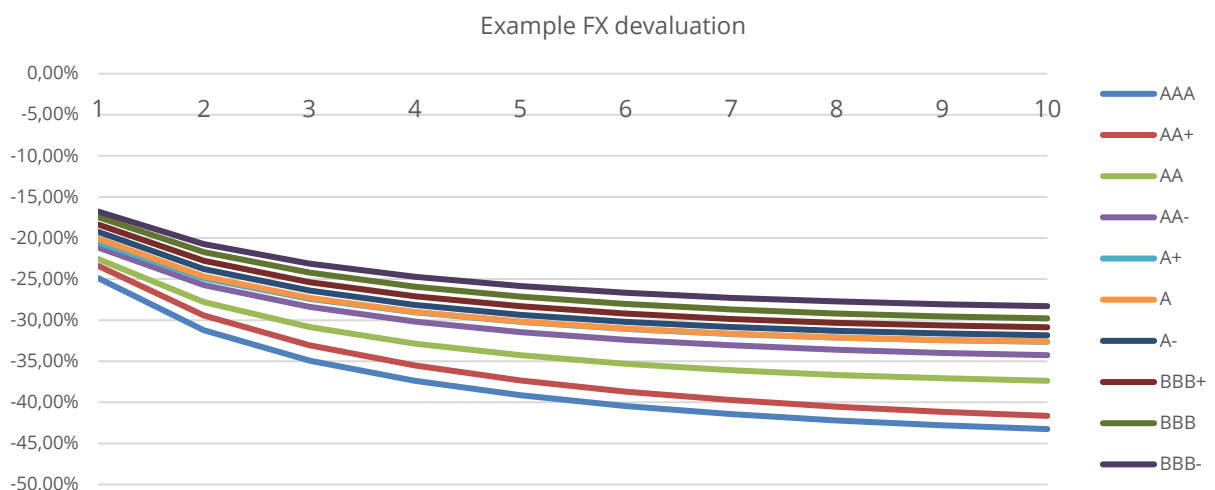


6.2 Foreign currency risk modeling

Similar to forecasting Interest rate stress, CRA assesses FX rate risks by stressing historical exchange quotes in the pertinent market, taking into account FX volatility. The modeling approach to derive losses due to FX risk is similar to a parametric VaR model. Average returns and standard deviations of currency baskets are calculated based historical FX data of selected currencies. Then factors are applied to define the rating level stresses, which are fed into the cash-flow analysis.

Typically, we calculate both, currency appreciations and devaluations for specific time horizons to apply these stress scenarios into the cash-flow analysis on foreign currency denominated cover assets and covered bonds.

Figure 2: Example covered bonds FX devaluation over time for specific rating class | Source: CRA



7 Appendix II: Modeling approach of mortgage collateral

In the case of cover pools backed by mortgage collateral, CRA uses relevant historical information (aggregated or at loan-level, macroeconomic- and issuer-specific performance data) to characterize the cover pool (i.e. geographic distribution, delinquencies, arrears, seasoning, LTVs, NPL shares etc.) and elicit the pool's credit risk profile. The results define base-case default and recovery assumptions, which are used to size rating-level specific stress scenarios.

7.1 Portfolio default distribution

One typical characteristic of real estate portfolios is a relatively high degree of granularity. CRA will typically estimate credit risk in granular cover pools using a Large Homogeneous Portfolio ("LHP") approach to derive the default distribution of the portfolio at the relevant time horizon. Under the LHP assumption, there are two relevant input parameters to estimate the default distribution: (1) mean asset probability of default and (2) asset default correlations at the relevant time horizon.

An initial PD or expected default rate for a given portfolio is calculated using the past credit loss rates of the issuer, e.g. NPL stocks and the write-offs published by the issuer. In a prognostic context, the probability of default rate of cover pool assets at a given time t can be approximated by: $PD_t = NPL_{t+1} - NPL_t + \alpha * NPL_{t-1}$, where α represents the written-off loan portions in period $t-1$. If the derived loss rate has a high variance or a negative value, CRA may consider the average NPLs of recent years as the initial PD of the respective portfolio. Once the default rate is derived, the rating specific portfolio cumulative default rate is derived by using the Vasicek approximation to LHP default rates.

CRA assumes a conservative asset default correlation of 15% on residential and commercial credit portfolios, which is in line with BASEL II IRB Risk Weight Function⁷. However, CRA may adjust this assumption based on a particular jurisdictions and concentrations (i.e. industry, geography etc.). Other important components taken into account when deriving the rating default rates are the weighted average life of covered bonds and cover assets, and the proportion of residential and commercial mortgage credits of the portfolio.

CRA may evaluate a portfolio's loan- borrower- and property specific information to adjust and differentiate base-case assumptions derived from issuer-specific performance data, macroeconomic and market data, if available.

Creditreform Rating may apply conservative adjustments to base-case assumptions for cover pools with a low degree of homogeneity (high granularity and high dispersion of borrower credit quality).

⁷ An Explanatory Note on the BASEL II IRB Risk Weight Functions (July 2005)

7.2 Portfolio recovery rates

When determining recovery rates for mortgage pools in specific rating scenarios, CRA considers market and transaction-specific information, such as Loan-to-Value ratios (LTVs) and property data, along with issuer and market recovery performance data. We typically rely on issuer-provided data for these assumptions.

To derive recovery rates, we estimate portfolio Loss Given Defaults (LGDs), primarily based on house price indexes (HPIs) and adjusted by quick sale factors and LTVs. HPIs are country-specific, reflecting commercial and residential property price trends. We use stochastic time series processes, like ARIMA, to derive property level haircuts from indexed values of residential and commercial properties for respective countries.

The computed weighted average LGDs are then adjusted to LTV distributions and the weighted average maturity of covered bonds, provided by the issuer. Finally, the weighted average recovery rate for a given rating scenario is estimated using the formula ($RRR = 1 - LGD$).

In the absence of further differentiating data, CRA will make use of public information, i.e. historical development of the real estate market and mortgage price indices, other macroeconomic data and market studies to derive country-specific base-case assumptions and reasonable recovery stresses, including assumptions about foreclosure and asset-sale costs.

8 Appendix III: Modeling approach of public sector collateral

Sovereign cover pools are generally less granular than real estate portfolios. Importantly, the amount of creditors in the portfolio is typically very limited. Under such conditions, the assumption of high homogeneity and low dispersion of borrower credit quality does not hold and the LHP approximation is not suitable to assess the cover pool credit risk. CRA will determine risks in non-granular portfolios by means of market-standard factor models in a Monte-Carlo ("MC") simulation framework. In this framework, multiple risk factors and different dependency structures can be evaluated. By definition factor models sketch the relationship between different events, for example, state of the economy and the occurrence of defaults in a credit portfolio.

8.1 Portfolio default distribution

The base-case default assumption for sovereign credits will be derived from the respective CRA long-term sovereign rating. If the collateral is located in a country for which CRA has not yet assigned a long-term sovereign rating, CRA will use its internal credit score to assign a preliminary sovereign rating for that specific country. For cover pools including sub-sovereign credits, we typically consider the ultimate obligor credit rating – i.e. the sovereign rating – as relevant unless current information indicates that credits at the federal

and/or municipal level will not receive ultimate obligor support. In this case, we may apply a qualitative down-notching to sub-sovereigns which will be sized taking into account all relevant aspects.

The default rates of the sovereign ratings are used as annual base-case default rates for each country. Using information provided by the issuer and available public information, CRA constructs an exposure to exposure portfolio distributions taking into account the residual maturity profile of the portfolio and assigns base case PDs to the sovereigns or sub-sovereigns collateral along with a default correlation. The default correlations can vary between 12% and 24% for sovereigns, sub- sovereigns and federal and/or municipal exposures.

In deriving base-case assumptions by Monte-Carlo (“MC”) simulation, CRA will rely on portfolio information provided by the issuer that contains a minimum breakdown of variables. This information may be derived from public sources (e.g. HTT templates) or from internal sources of the issuer.

8.2 Portfolio recovery rates

Generally, Creditreform applies recovery rate assumptions to government obligations, which are based on historical data and empirical research, varying by rating scenario. The table below indicates our recovery assumptions from sovereigns or federal authorities for different rating-category stress levels:

Table 1: Recovery rate assumptions for sovereign credit | Source: CRA

AAA	AA	A	BBB	BB	B	CCC	CC	C
25%	30%	35%	40%	45%	50%	50%	50%	50%

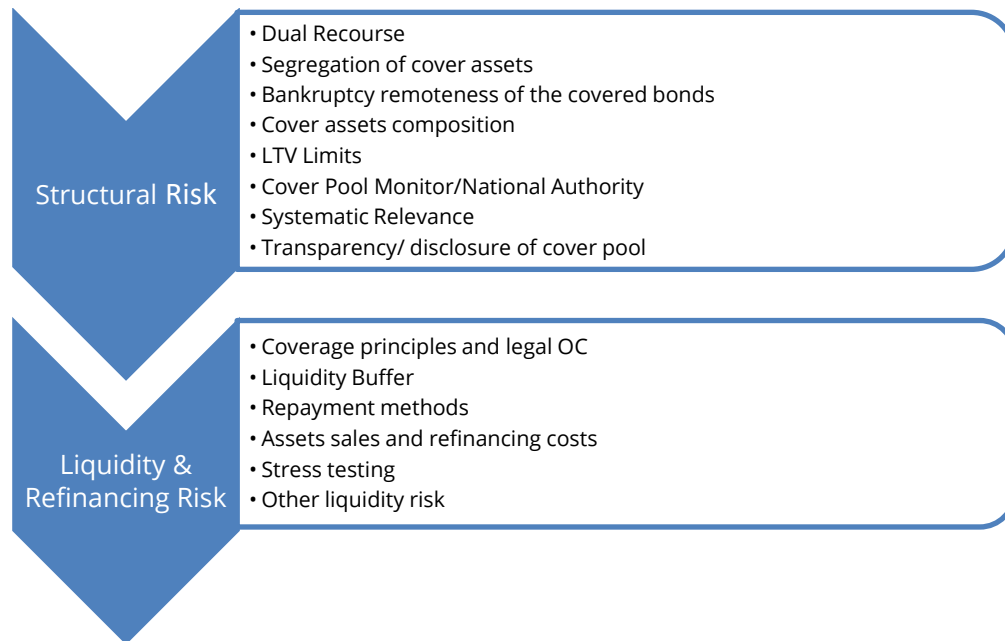
We believe that municipalities or local authorities may have higher recoveries, indicating possible federal support during default. This is considered when adjusting recovery assumptions, which can differ based on the debtor type (local or municipal authorities).

9 Appendix IV: Notching approach for primary rating uplift

As previously stated, CRA uses an internal scoring system to assess the strengths and weaknesses of a legislative framework(s) with respect to structural risks, and the effectiveness in mitigating liquidity- and refinancing risks for the primary rating uplift.

The most important elements of a relevant national legislative framework that are taken into account in our assessment are shown in the following diagram:

Figure 3: Primary uplift notching factors



The notches resulting from the structural risk are added to the rating floor/ issuer rating, which can be a maximum of +4 notches, and the notches resulting from the liquidity- and refinancing risk are added to the rating floor/ issuer rating, and structural risk, which can be a maximum of +2 notches.

In determining the notching of structural risk, and liquidity- and refinancing risk, CRA uses varying weights for the above mentioned legal and regulatory components. Maximum weights are given to factors such as segregation of cover assets, bankruptcy remoteness or coverage principles and legal OC, while factors such as fulfillment of stress tests, cover pool monitor or disclosure of cover pool are given diminishing weights. However, a stand-alone component is not sufficient to ensure a rating notch. The covered bonds legislation is subject to constant amendments, prompting the CRA to constantly monitor the regulatory components and update the assessment. If necessary, the analyst's discretion is also taken into account.

The assessment can be demonstrated using the Austrian legal framework for covered bonds (Figure 4). Before the harmonization of covered bonds in EU countries coming into force in 2022, the *Fundierte Bankschuldverschreibungen* ("FBSchVG") was one of the existing regulatory frameworks in Austria, which was replaced by the new *Pfandbriefgesetz* ("PfandBG"). For the covered bond programs issued under FBSchVG, CRA only assigned +3 notches for the structural risk and +/-0 notch for the liquidity and refinancing risk due to non-fulfilment of the requirements for the composition of cover pools, LTV limits, coverage principles and legal OC requirements as well as the scope/frequency of disclosure. However, the PfandBG meets these criteria either in full or in part. Therefore, their combined weights are sufficient to ensure +4 notches for

structural risk and +1 notch for liquidity- and refinancing risk for the covered bond programs issued under this framework.

Figure 4: Primary rating uplift

