

# **CRISIL Ratings methodology for collateralised debt obligation**

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## 1 Executive summary

A collateralised debt obligation (CDO) is a security issued against receivables on corporate debt instruments. CDOs are typically originated by banks or non-banking financial institutions (NBFCs) through sale of a pool of corporate debt to a special purpose vehicle (SPV), which issues CDOs.

CRISIL Ratings considers the following when rating CDOs:

- 1. Underlying assets in the pool:** CRISIL Ratings analyses each individual underlying asset in the pool and estimates the credit rating of each obligor.
- 2. Transaction structure:** CRISIL Ratings studies the transaction structure, specifically, the waterfall mechanism, over-collateralisation and coverage ratios, and interest rate risks inherent in the transaction, to ascertain claims on cash flows from the underlying assets.
- 3. Simulation of portfolio shortfall distribution:** CRISIL Ratings simulates pool collections and potential shortfall in debt servicing using its proprietary CDO model. The inputs in the model are the probability of default in the underlying assets (as indicated by their credit ratings), asset cash flows, asset correlations and estimation of recovery rate.
- 4. Linkage of credit enhancement to the rating of the CDO:** Credit enhancement helps reduce the weighted average shortfall in debt servicing for the rated tranche. CRISIL Ratings determines whether the credit enhancement is at a level where these shortfalls are commensurate with a plain vanilla instrument of a similar rating.
- 5. Legal analysis of the transaction:** As in any securitisation transaction, CRISIL Ratings undertakes legal due diligence while rating CDOs. In addition, CRISIL Ratings relies on the opinions of independent, external legal counsel pertaining to the valid sale of the asset transfer, bankruptcy remoteness of the transferred assets and compliance with local laws.

## 2 Scope

This article<sup>1</sup> explains the CRISIL Ratings criteria for rating CDOs. The rating is assigned such that the CDO's credit quality is similar to that of a plain vanilla single obligor security rated at the same level.

## 3 How a CDO works

A CDO is typically issued against receivables on corporate debt instruments originated by banks or NBFCs. The assets pooled in a CDO are, usually, corporate loans, debentures, bonds and other classes of debt instruments. Depending on the type of assets in the pool, CDOs may be characterised as collateralised bond obligations (CBOs);

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<sup>1</sup> This article is being republished following a periodic review of criteria in May 2024, with no major revisions. The previous version of this article, which was published in September 2021, can be accessed here: [https://www.crisilratings.com/content/dam/crisil/criteria\\_methodology/structured-finance/archive/CRISILs-rating-methodology-for-CDO-transactions-sep2021.pdf](https://www.crisilratings.com/content/dam/crisil/criteria_methodology/structured-finance/archive/CRISILs-rating-methodology-for-CDO-transactions-sep2021.pdf)

where the pool consists entirely of debentures and bonds) or collateralised loan obligations (CLOs; where the pool consists entirely of loans).

A CDO, similar to an asset-backed securitisation transaction, is created by the sale of a pool of assets by a financial institution to a SPV, which, in turn, issues CDOs, giving investors right to cash flows arising from the underlying pool. The SPV may issue multiple classes of securities (tranches) with differing rights to the cash flows. Based on the payment waterfall and prioritisation of cash flows, the credit ratings of certain tranches may be higher than the rating of the underlying assets. For instance, a rating of 'AAA' may be assigned to a tranche with a pool of 'A'-rated corporate debentures if a sufficient amount of lower-rated tranches are available within the transaction structure.

## 4 Components of CDO rating

### 4.1 Credit analysis of the underlying pool assets

The performance of a CDO depends on the repayment capacity of the underlying obligors or their credit quality. However, the process of analysing the credit quality of the underlying assets in a CDO is different from that for typical asset-backed securitisation (ABS) transactions backed by retail loans. Every asset in the CDO pool warrants detailed and specific analysis, while the underlying assets in a typical ABS transaction are analysed collectively as a large pool of small loans. This is because:

Securitisations of retail loans have numerous obligors, while CDO pools have fewer loans and obligors

Retail asset pools are more homogenous than corporate loans pooled into CDOs, especially as originators may pool diverse obligors to avail of diversification benefits

Underlying corporate debt in CDO issuances usually have readily available credit opinion (typically from credit rating agencies), unlike retail borrowers who are the underlying obligors in securitised commercial vehicle pools or microfinance loan pools

To determine the credit quality of the CDO pool, the credit quality of each underlying obligor is ascertained using the published credit rating of CRISIL Ratings on the obligor. Where a published rating is not available, the internal rating opinion of CRISIL Ratings on the obligor is used. CRISIL Ratings assesses the credit ratings of obligors (both published and internal rating opinion) through an analysis of their business and financial risk profiles, management quality and other relevant parameters.

### 4.2 Analysis of the transaction structure

Although structures vary across CDO transactions, some common issues to be examined include:

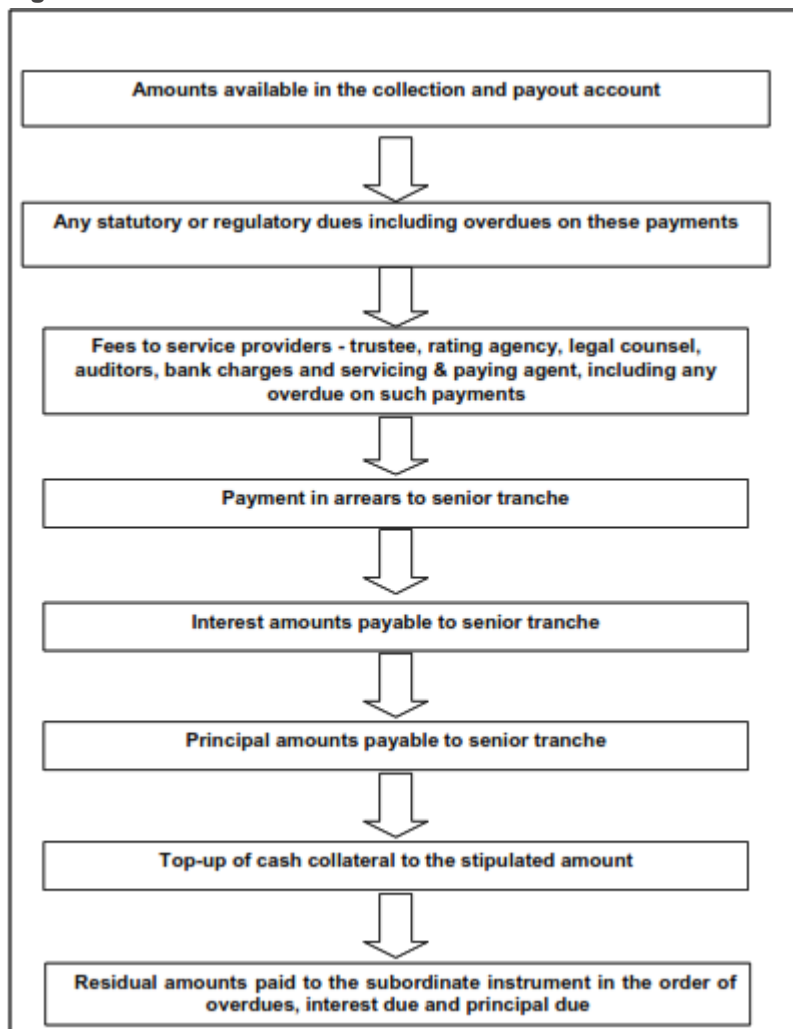
- Waterfall mechanism
- Over-collateralisation and coverage tests
- Interest rate risks

### 4.2.1 Waterfall mechanism

A waterfall mechanism specifies the priority of payment across various tranches of instruments issued during the CDO's tenure (see Figure 1 for an illustration of a hypothetical waterfall mechanism in a securitisation transaction involving two classes of securities, senior and subordinate).

Typically, different tranches of a CDO may have varying seniority. The cash flows collected from the underlying pool are paid out in the order of seniority of the tranches. In other words, cash flows from the underlying pool may be used for payouts to a particular tranche only after fully meeting the promised payouts of all senior tranches. Consequently, credit shortfalls in the pool are absorbed by lower-ranked tranches before the shortfalls can be charged to any senior tranche.

**Figure 1: An illustrative waterfall mechanism**



The priority of payments across tranches could differ during periods of stress—when the pool's actual performance is less than originally envisaged. The waterfall mechanism may have in-built triggers (see the section 'Over-collateralisation and coverage tests'), which would alter the priority of payments in favour of senior tranches. The altered waterfall provides a higher degree of protection to senior tranches compared with subordinate tranches.

## 4.2.2 Over-collateralisation and coverage tests

These tests allow the senior instruments to be amortised faster if a stress situation, as indicated by the test, unfolds. The altered amortisation schedule increases protection for senior instruments.

Over-collateralisation and coverage tests are frequently integrated into the transaction waterfall by international CDO issuers.

### 4.2.2.1 Over-collateralisation test

Over-collateralisation for a tranche is the extent of protection offered by subordinate tranches. The over-collateralisation ratio is obtained by dividing the current collateral value by the aggregate outstanding amount of the tranche being tested for over-collateralisation. The ratio is calculated and tested periodically to check if it is at least equal to a specified minimum percentage.

Over-collateralisation tests are designed to ensure that an over-collateralisation cushion is maintained throughout the tenure of the CDO to protect the senior debt from shortfalls in the pool of assets.

Under this test, if the over-collateralisation ratio for a senior tranche falls below a predetermined level (say 105%)—a situation that may occur because of more-than-expected default by the underlying obligors—the payments due to the junior tranche/s are suspended and the cash flows are used to prepay the senior tranche till such time as the ratio breach is cured (in other words, till the ratio exceeds the trigger level, 105% in this case).

### 4.2.2.2 Interest coverage test

In principle, interest coverage tests are similar to over-collateralisation tests and are designed to validate whether the cushion between the interest earned on the asset portfolio and interest cost to be paid on the CDO securities (liabilities) is consistent with the current rating. The interest coverage ratio is calculated by dividing the aggregate expected interest inflows from the underlying assets by the aggregate interest amount payable to the CDO tranches.

If, due to defaults or other reasons, the interest inflows in the pool fall below a predetermined multiple (say 1.1 times) of the interest outflow to the CDO tranches, the interest coverage test accelerates the amortisation of the senior tranches. This process will result in lower interest outflows in subsequent periods. The process is continued until the trigger is cured, that is, the interest inflows into the pool exceed the predetermined multiple of interest outflow.

## 4.2.3 Interest rate risk

An interest rate risk arises if there is a mismatch between the interest terms on the underlying portfolio and the CDO tranches issued. The common sources of interest rate risk are:

*Differences in interest rate terms:* The underlying assets (asset-side) may have a floating interest rate while the CDO (liability-side) has a fixed interest rate, or vice versa. Mismatches could also arise from the use of different interest rate benchmarks to arrive at asset-side and liability-side floating rates.

*Differences in periodicity:* If the underlying assets pay interest more frequently than the CDO tranches, it could lead to negative carry, especially if the collected cash sits idle in the SPV or generates a lower return than the coupon payable on the CDO.

*Differences in payment dates:* Mismatches between the date on which the interest is received from the underlying assets and the date on which the coupon is paid on the CDO may lead to situations of negative carry or shortfall in the amounts that need to be paid.

CRISIL Ratings factors in the sources of interest risk for each transaction and analyses the structural features incorporated by the originators to mitigate these risks. If the structural features are inadequate, CRISIL Ratings will apply appropriate interest rate stresses.

### **4.3 Simulation of portfolio shortfall distribution using the CRISIL Ratings CDO model**

CRISIL Ratings has developed a proprietary portfolio analytics tool that uses Monte Carlo simulations incorporating asset default probabilities, cash flows, correlations and recovery rate assumptions to simulate portfolio default and shortfall distribution statistics. The use of this tool to analyse portfolio quality is the most important step in the CDO rating process.

#### **4.3.1 Monte Carlo simulation**

Under the Monte Carlo simulation, a number of independent trials are simulated. Each trial randomly generates a set of numbers, each number having a one-to-one correspondence with an identified cash flow (a specific interest/principal obligation from a specific obligor). For example, if the pool consists of 30 five-year loans, 150 numbers will be generated in each simulation. The first five numbers correspond to the five annual cash flows of asset 1, the next five correspond to those of asset 2 and so on.

In a particular trial, based on the relevant random number generated, each asset is determined to have either paid on time or defaulted in a manner consistent with the probability of default associated with that asset's credit rating. For instance, if the probability of default on a given asset is 10%, the simulation engine will ensure that, on average, that asset defaults 10 times in every 100 trials.

The model also incorporates asset correlation assumptions while simulating portfolio behaviour. The accumulation of the behaviour of each asset in the portfolio in a trial gives the total portfolio default for that particular trial. The portfolio default behaviour for the entire set of trials gives the portfolio shortfall distribution, assuming there are nil recoveries on the defaulted assets.

The ultimate portfolio shortfall rate (the total shortfall in debt servicing in a trial as a percentage of total portfolio cash flows) can be arrived at after factoring in recoveries on the defaulted assets. The ultimate shortfall rates across different trials are plotted with the corresponding probabilities of occurrence to arrive at the ultimate portfolio shortfall distribution.

#### **4.3.2 Inputs for the CDO model of CRISIL Ratings**

**The key inputs for the CDO model are:**

- Asset ratings and associated default probabilities (computed from the default statistics of CRISIL Ratings)
- Asset cash flows (based on the underlying assets)

- Asset correlation assumptions (based on the in-house database of CRISIL Ratings on asset behaviour in the rated and non-rated universe)
- Assumptions on the level and timing of recoveries expected within the tenure of the CDO (based on the servicer's experience in various asset classes)

### 4.3.3 Asset ratings and associated default probabilities

The methodology to determine asset ratings has been discussed in the 'Credit analysis of underlying pool assets' section. The default probabilities of individual assets in a CDO are embedded in the asset's credit rating and maturity. Based on the asset rating and its tenure, a default probability is assigned to each cash flow of each obligor based on the default matrix of CRISIL Ratings.

CRISIL Ratings has comprehensive rating statistics by virtue of its extensive coverage of the Indian debt market since its inception in 1987, and has developed a default matrix based on the performance of its ratings. This matrix provides the default probability of each rating across tenures.

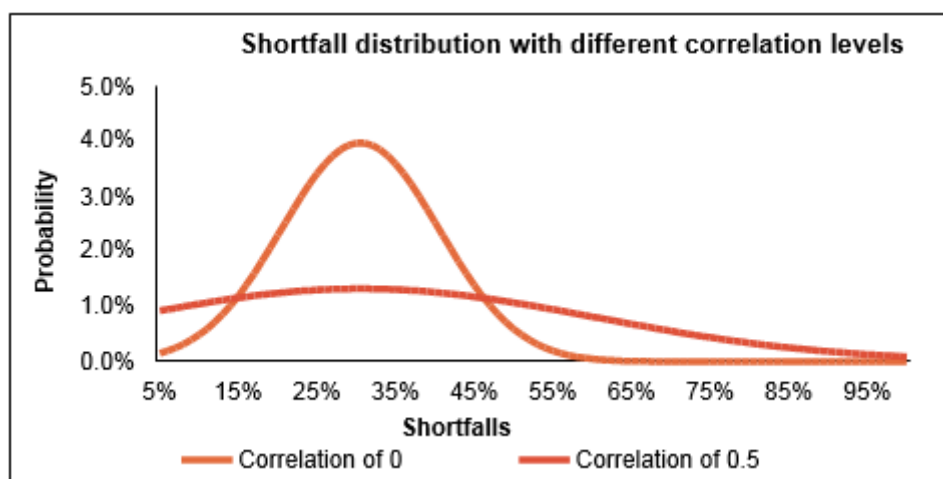
### 4.3.4 Asset cash flows

CRISIL Ratings projects the cash flows available from the underlying pool. The cash flow estimation will factor in potential prepayments and interest rate movements during the tenure of the underlying assets.

### 4.3.5 Asset correlation assumptions

Correlation assumptions are based on the extensive experience of CRISIL Ratings in the Indian corporate debt market across industries. It is intuitive to expect companies in the same industry to have a higher correlation than those in different industries. Accordingly, assets in the same industry are assumed to have higher levels of correlation than assets from other industries. If borrowers belong to the same corporate group, CRISIL Ratings may factor in higher correlation assumptions to factor in more inter-linkages.

The chart below shows the effects of correlation on the probability distribution of shortfalls for a hypothetical pool of 100 assets:



The two scenarios considered are correlation of 0 and 0.5 between assets in the pool. A higher correlation changes the portfolio default distribution pattern, leading to more frequent extreme events ("fat tails" in statistical terms),



even though the mean remains unchanged. Both the standard deviation and the extremes (very low and very high shortfall levels) increase significantly as the correlation increases.

#### **4.3.6 Recovery rate assumptions for defaulted assets**

Typically, the rate and timing of recovery are a function of:

- Liquidity and value of the security pledged
- Lender's legal seniority (secured or unsecured) and operational seniority in the borrower's capital structure (term lender or working capital lender)
- The servicer's recovery track record

The recovery assumptions are based on the historical track record of the banking sector's recoveries from non-performing assets. CRISIL Ratings gives credit for servicers with a track record of higher recoveries and also takes into account recoveries on the defaulted assets but only until the maturity of the CDO. No benefit is factored in for recoveries beyond the scheduled maturity of the CDO.

Based on these factors, CRISIL Ratings carries out the Monte Carlo simulation exercise. This simulates the pool collections and shortfalls under each trial. With a sufficiently large number of such trials, the portfolio shortfall distribution is generated.

#### **4.4 Linkage of credit enhancement to the rating of the CDO**

Based on the portfolio shortfall distribution generated by the Monte Carlo simulation and the transaction structure, the weighted average shortfalls of the CDO tranches are estimated. Credit enhancements tend to reduce the shortfalls in debt servicing. The weighted average shortfall in debt servicing (after factoring in credit enhancement) for each CDO tranche is benchmarked with that of a vanilla bond to arrive at the rating of the CDO tranche.

#### **4.5 Legal analysis of the transaction**

The rating process includes a detailed analysis of the legal structure adopted and the regulatory issues arising in the transaction. The in-house legal team of CRISIL Ratings studies all relevant transaction-related legal documents and analyses the issues of asset transferability, bankruptcy remoteness and the valid sale nature of the asset transfer, and compliance with local laws. As post-default recoveries on assets are considered a positive in the rating analysis, the security relating to the underlying debt instruments is also examined to determine whether it has been perfected and whether it remains valid even after the transfer of assets. CRISIL Ratings also examines whether the necessary stamp duties and other dues have been paid.

In addition, CRISIL Ratings requires the originator to submit an opinion from an independent legal counsel. This opinion is required to address (with reasoning and reference to specific case laws, if necessary) the relevant legal issues and uncertainties associated with the structure.

## 5 Conclusion

The CRISIL Ratings criteria for rating CDOs incorporates all the parameters pertinent to the credit quality of typical CDO instruments in the Indian context, including the credit quality of the underlying borrowers, the detailed transaction structure and legal aspects of the transaction.

## About CRISIL Ratings Limited (A subsidiary of CRISIL Limited)

CRISIL Ratings pioneered the concept of credit rating in India in 1987. With a tradition of independence, analytical rigour and innovation, we set the standards in the credit rating business. We rate the entire range of debt instruments, such as, bank loans, certificates of deposit, commercial paper, non-convertible / convertible / partially convertible bonds and debentures, perpetual bonds, bank hybrid capital instruments, asset-backed and mortgage-backed securities, partial guarantees and other structured debt instruments. We have rated over 33,000 large and mid-scale corporates and financial institutions. We have also instituted several innovations in India in the rating business, including rating municipal bonds, partially guaranteed instruments and infrastructure investment trusts (InvITs).

CRISIL Ratings Limited ("CRISIL Ratings") is a wholly-owned subsidiary of CRISIL Limited ("CRISIL"). CRISIL Ratings Limited is registered in India as a credit rating agency with the Securities and Exchange Board of India ("SEBI").

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It has delivered independent opinions, actionable insights, and efficient solutions to over 100,000 customers through businesses that operate from India, the US, the UK, Argentina, Poland, China, Hong Kong and Singapore.

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