

# **CRISIL's rating methodology for collateralised debt obligations (CDO)**

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## Executive summary

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

The key components of CRISIL's rating process for CDOs are:

- 1. Credit analysis of underlying debt obligations in the pool:** CRISIL analyses each individual underlying asset in the pool and estimates the credit rating of each obligor.
- 2. Analysis of transaction structure:** CRISIL 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 underlying assets.
- 3. Simulation of portfolio shortfall distribution:** CRISIL simulates pool collections and potential shortfall in debt service using its proprietary CDO model. The inputs to the model are the probability of default of underlying assets (as indicated by credit ratings), asset cash flows, asset correlations, and estimations of recovery rate.
- 4. Linkage of credit enhancement to rating of the CDO:** Credit enhancement helps in reducing the weighted average shortfall in debt service for the rated tranche. CRISIL determines whether the quantum of credit enhancement is at a level where these shortfalls are commensurate with a plain vanilla instrument of similar rating.
- 5. Legal analysis of transaction:** As in any securitisation transaction, CRISIL undertakes legal due diligence while rating CDOs. In addition, CRISIL relies on opinions of independent external legal counsel pertaining to 'true sale' nature of asset transfer, bankruptcy remoteness of the transferred assets and compliance with local laws.

## Scope

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

## How a CDO works

A CDO is typically issued against receivables from corporate debt instruments originated by banks or non-banking financial institutions. The pool assets in a CDO are, usually, corporate loans, debentures, bonds, and other classes of debt instruments. Depending on the type of assets

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<sup>1</sup> This article is being republished following a periodic review of criteria in September 2018, with no major revisions. The previous version of this article, which was published in September 2015, can be accessed here: [https://www.crisil.com/content/dam/crisil/criteria\\_methodology/structured-finance/archive/CRISILs-rating-methodology-for-CDO-transactions.pdf](https://www.crisil.com/content/dam/crisil/criteria_methodology/structured-finance/archive/CRISILs-rating-methodology-for-CDO-transactions.pdf)

in the pool, certain CDOs may be characterised as collateralised bond obligations (CBOs; 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 sale of a pool of assets by a financial institution to a SPV. The SPV, in turn, issues CDOs, giving investors right to cash flows arising from the underlying pool. It is possible that the SPV issues multiple classes of securities (tranches) with differing rights to the cash flows. Based on the payment waterfall and prioritisation of cash flows, it is possible that the credit ratings of certain tranches are 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 is available within the transaction structure.

## Components of CRISIL'S CDO rating

### 1. Credit analysis of the underlying pool assets

The performance of a CDO is dependent on the underlying obligors' capacity to repay, or the underlying obligors' credit quality. However, the process of analysing the credit quality of underlying assets in a CDO is very different from that for typical asset-backed securitization (ABS) transactions backed by retail loans. Every individual 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. Reasons for this analytical difference:

- Securitisations of retail loans have numerous obligors, while CDO pools have much fewer loans and obligors.
- Retail asset pools are more homogenous than corporate loans pooled into CDOs, especially since originators may pool diverse obligors together to avail of diversification benefits.
- Corporate debt underlying CDO issuances usually has 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 CRISIL's published credit rating on the obligor. Where a published rating is not available, CRISIL's internal rating opinion on the obligor is employed. CRISIL assesses the obligors' credit rating (both published and internal rating opinion) through an analysis of their business and financial profiles, management quality, and other relevant parameters in the rating process.

### 2. Analysis of transaction structure

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

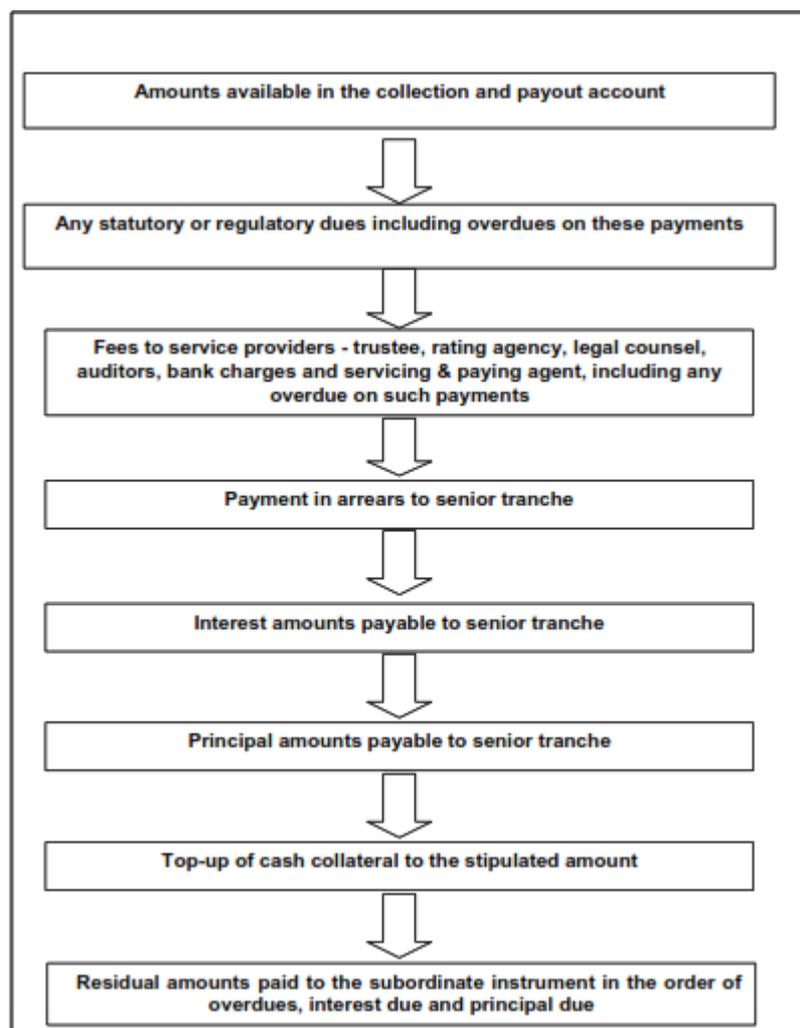
- Waterfall mechanism
- Over-collateralisation and coverage tests
- Interest rate risk

## Waterfall mechanism

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 tranches. In other words, cash flows from the underlying pool may be used to make pay-outs to a particular tranche of security only after fully meeting the promised pay-outs of all tranches senior to it. Consequently, credit shortfalls in the underlying 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 there is a negative deviation in the pool's actual performance compared with what was originally envisaged. The waterfall mechanism could 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 as compared with subordinate tranches.

## Over-collateralisation and coverage tests

These tests may be incorporated so that the senior instruments can be amortised faster in case 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.

### Over-collateralisation (OC) test

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

OC tests are designed to ensure that an OC cushion is maintained throughout the CDO's tenure to protect the senior debt from shortfalls in the pool of assets.

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

### Interest-coverage (IC) test

In principle, IC tests are similar to OC tests and are designed to validate whether the cushion between the interest earned on the asset portfolio and interest costs to be paid on the CDO securities (liabilities) are consistent with the securities' current rating level. IC ratio is calculated by dividing the aggregate interest inflows expected to be received from the underlying assets by the aggregate interest amount payable to the CDO tranches.

If, due to defaults or for other reasons, the interest inflows on the pool reduce below a certain predetermined multiple (say 1.1 times) of the interest outflow to the CDO tranches, the IC test accelerates the amortisation of the senior tranches. This process will result in lower interest outflows in subsequent periods. The process is continued until such time as the trigger is cured, i.e. the interest inflows into the pool exceed the predetermined multiple of interest outflows.

## Interest-rate risk

Interest-rate risk arises when there is a mismatch between the interest terms on the underlying portfolio and the CDO tranches issued. Common sources of interest rate risk are:

- *Differences in interest rate terms*: The underlying assets (asset-side) may pay a floating interest rate while the CDO (liability-side) has a fixed interest rate, or vice versa. Mismatches could also arise from 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 do, 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 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 factors in the sources of interest rate risk for each transaction and analyses the structural features incorporated by the originators to mitigate these risks. If the structural features are inadequate, CRISIL will apply appropriate interest rate stresses.

### 3. Simulation of portfolio shortfall distribution using CRISIL's CDO model

CRISIL has developed a proprietary portfolio analytics tool that uses Monte Carlo simulations incorporating asset default probabilities, asset cash flows, asset 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 CRISIL's CDO rating process.

#### Monte Carlo simulation

Under 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 repayment from a specific obligor). For example, if the pool consists of 30 loans of five-year tenure, 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% (derived based on its credit rating), 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 of the assets 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 no recoveries on the defaulted assets.

The ultimate portfolio shortfall rate (the total shortfall in debt service 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.

## Inputs for CRISIL's CDO model

### Key inputs for CRISIL's CDO model are:

- Asset ratings and associated default probabilities (computed from CRISIL's default statistics)
- Asset cash flows (based on the underlying assets)
- Asset correlation assumptions (based on CRISIL's in-house database of 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 past experience with various asset classes)

## Asset ratings and associated default probabilities

The methodology employed in determining asset ratings has been discussed above (see the section 'Credit analysis of underlying pool assets'). 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 asset tenure, a default probability is assigned to each cash flow of each obligor based on CRISIL's default matrix.

CRISIL 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.

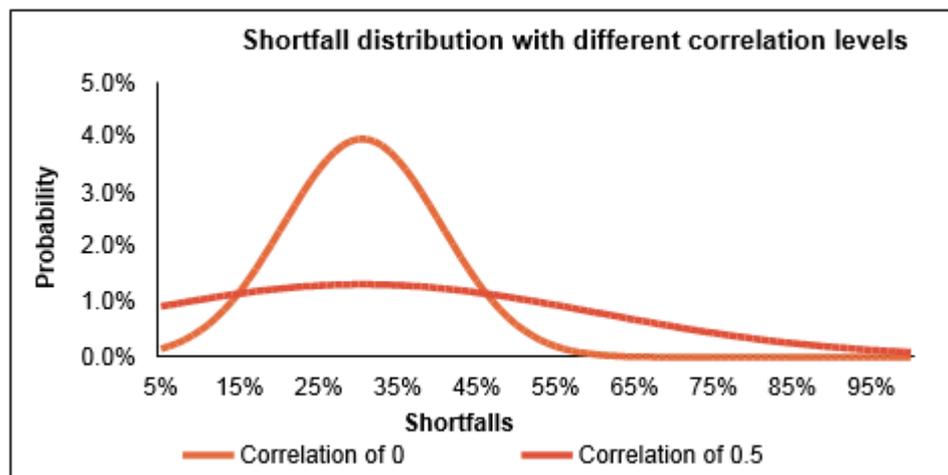
## Asset cash flows

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

## Asset correlation assumptions

CRISIL's correlation assumptions are based on its long experience 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 may factor in higher correlation assumptions in order to factor in higher degree of 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 correlations 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.

### Recovery rate assumptions for defaulted assets

Typically, the rate and timing of recovery is 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), and
- The servicer’s recovery track record

CRISIL’s recovery assumptions are based on the historical track record of the banking sector’s recoveries from non-performing assets. CRISIL gives credit for servicers with a track record of higher recoveries. CRISIL 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, the Monte Carlo simulation exercise is carried out. 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. Linkage of credit enhancement to rating of the CDO

Based on the portfolio shortfall distribution generated by Monte Carlo simulation and the transaction structure, the weighted average shortfall levels of the CDO tranches are estimated. Credit enhancements will tend to lower the shortfalls in debt service. The weighted average shortfall in debt service (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.

## 5. Legal analysis of transaction

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

In addition, CRISIL 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.

## Conclusion

CRISIL's criteria for rating CDOs, as outlined in this document, incorporates all the parameters pertinent to the credit quality of typical CDO instruments issued in the Indian context. The parameters analysed for rating CDOs include credit quality of underlying borrowers, detailed transaction structure and legal aspects of the transaction.

## About CRISIL Limited

CRISIL is a leading, agile and innovative global analytics company driven by its mission of making markets function better.

It is India's foremost provider of ratings, data, research, analytics and solutions, with a strong track record of growth, culture of innovation and global footprint.

It has delivered independent opinions, actionable insights, and efficient solutions to over 100,000 customers.

It is majority owned by S&P Global Inc, a leading provider of transparent and independent ratings, benchmarks, analytics and data to the capital and commodity markets worldwide.

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CRISIL Ratings is part of CRISIL Limited ("CRISIL"). We pioneered the concept of credit rating in India in 1987. CRISIL is registered in India as a credit rating agency with the Securities and Exchange Board of India ("SEBI"). With a tradition of independence, analytical rigour and innovation, CRISIL sets 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 24,500 large and mid-scale corporates and financial institutions. CRISIL has also instituted several innovations in India in the rating business, including rating municipal bonds, partially guaranteed instruments and microfinance institutions. We also pioneered a globally unique rating service for Micro, Small and Medium Enterprises (MSMEs) and significantly extended the accessibility to rating services to a wider market. Over 1,10,000 MSMEs have been rated by us.

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