

Collateralized debt obligation

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In financial markets, **collateralized debt obligations** (**CDOs**) are a type of asset-backed security and structured credit product. CDOs gain exposure to the credit of a portfolio of fixed-income assets and divide the credit risk among different tranches: senior tranches (rated AAA), mezzanine tranches (AA to BB), and equity tranches (unrated). Losses are applied in reverse order of seniority and so junior tranches offer higher coupons (interest rates) to compensate for the added risk. CDOs serve as an important funding vehicle for portfolio investments in credit-risky fixed-income assets.

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Market history and growth

First issued in the late 1980s, CDOs emerged a decade later as the fastest growing sector of the asset-backed synthetic securities market. This growth may reflect the increasing appeal of CDOs for a growing number of asset managers and investors, which now include insurance companies, mutual fund companies, unit trusts, investment trusts, commercial banks, investment banks, pension fund managers, private banking organizations, other CDOs and structured investment vehicles. It may also reflect the greater profit margins that CDOs provide their manufacturers.

A major factor in the growth of CDOs was 2001 introduction by David X. Li of Gaussian copula models, which allowed for the rapid pricing of CDOs.

Financial markets



Bond market

Fixed income
Corporate bond
Government bond
Municipal bond
Bond valuation
High-yield debt

Stock market

Stock
Preferred stock
Common stock
Stock exchange

Foreign exchange market

Retail forex

Derivative market

Credit derivative
Hybrid security
Options
Futures
Forwards
Swaps

Other Markets

Commodity market
OTC market
Real estate market
Spot market

Finance series

Financial market

According to the Securities Industry and Financial Markets Association, aggregate global CDO issuance totalled USD \$157 billion in 2004, USD \$249 billion in 2005, and USD \$489 billion in 2006. Research firm Celent estimates the size of the CDO global market to close to 2'000 billion by the end of 2006 [2]0

Financial market participants
Corporate finance
Personal finance
Public finance
Banks and Banking
Financial regulation

Concept

CDOs vary in structure and underlying collateral, but the basic principle is the same. First, a CDO entity acquires its inventory - such as income securities or asset-backed securities in a cash or synthetic format. Then, the CDO entity sells rights to the cash flows from the inventory along with associated risk. The sold rights are called tranches in accordance with the cash flow and risk assignment rules of the CDO: senior (rated AAA) tranches are paid first followed by mezzanine (AA to BB) tranches and, last of all, equity tranches (unrated).

As stated above, a CDO investor takes a position in an entity that has defined risk and reward, not directly in the underlying mortgages or asset backed securities. Therefore, the investment is dependent on the quality of the metrics and assumptions used for defining the risk and reward of the tranches, as well as the quality of the inventory. The qualities of the CDO that are defined by the CDO issuer can define the outcome of an investment in a CDO, in some cases as much or more than the quality of the inventory.

The manufacturer of this entity, typically an Investment Bank, takes a cut of the value of the inventory and obtains management fees. An investment in a CDO is therefore an investment in the promises and mathematical models of this intermediary, rather than an investment in the underlying collateral. This differentiates a CDO from a mortgage or a mortgage backed security (MBS).

Typically, the highest CDO tranche income rates are paid to those that will accept the highest credit default risks.

The loss of an investor's principal is applied in reverse order of seniority (i.e., highest credit risk tranches to lowest). The senior tranche is protected by the subordinated security structure; thus, it is the most highly rated tranche. The equity tranche (also known as the first-loss tranche or "toxic waste") is most vulnerable, and has to offer higher coupons to compensate for the higher risk.

The "arbitrage"^[1] of a CDO involves the spread between the income generated from the higher-yielding assets the CDO holds in its portfolio and the lower-yielding liabilities the CDO issues. Since the CDO issues mostly high-rated debt, the cost of the debt is less than the before-default cash flow generated by the CDO's assets. The yield on the CDO's assets minus the cost of the CDO's liabilities and expenses is called "excess spread", i.e.,

$$\text{excess spread} = \text{yield} - \sum \text{interest payable to each tranche} - \text{management fees and expenses}$$

Most of the excess spread is made available to equity investors in the CDO. The excess spread of the CDO must be sufficiently large to generate an attractive return for equityholders and this is a key consideration in the structuring of the CDO during the underwriting process. If losses on the CDO's assets are low, the spread can be substantial and lead to equity returns of 10% or higher but even a low

number of defaults on the CDO's assets can eliminate the CDO's excess spread and cause equityholders to lose up to their entire investment. If losses exceed the size of the equity tranche, losses are next applied to the most junior debt tranche and so on in reverse order of seniority.

The distribution of cash flow from the CDO's assets to the CDO's tranches is modeled in cash flow waterfalls. There are separate waterfalls for interest and principal. Cash flow is first used to cover top-priority expenses such as administrative fees and hedge costs. Next, cash flow is distributed sequentially from the most senior tranche to the most junior tranche.

CDOs are subject to certain interest coverage or overcollateralization tests. For instance, an overcollateralization coverage test may require the CDO to maintain a minimum ratio of assets in portfolio to senior debt outstanding. If the ratio is not maintained, cash flow is diverted to pay principal on the senior tranche. Missed interest payments to mezzanine tranches that result may not lead to default as many mezzanine tranches include pay-in-kind features, in which missed cash interest payments are added to the principal of the tranche.

CDOs may include subordinate management fees and subordinate expenses.

Structures

CDO is a broad term that can refer to several different types of products. They can be categorized in several ways. The primary classifications are as follows:

Source of funds -- cash flow vs. market value

- *Cash flow CDOs* pay interest and principal to tranche holders using the cash flows produced by the CDO's assets. Cash flow CDOs focus primarily on managing the credit quality of the underlying portfolio.
- *Market value CDOs* attempt to enhance investor returns through the more frequent trading and profitable sale of collateral assets. The CDO asset manager seeks to realize capital gains on the assets in the CDO's portfolio. There is greater focus on the changes in market value of the CDO's assets. Market value CDOs are longer-established, but less common than cash flow CDOs.

Motivation -- arbitrage vs. balance sheet

- *Arbitrage transactions* (cash flow and market value) attempt to capture for equity investors the spread between the relatively high yielding assets and the lower yielding liabilities represented by the rated bonds. The majority, 86%, of CDOs are arbitrage-motivated^[2].
- *Balance sheet transactions*, by contrast, are primarily motivated by the issuing institutions' desire to remove loans and other assets from their balance sheets, to reduce their regulatory capital requirements and improve their return on risk capital. A bank may wish to offload the credit risk on a large amount of loans in order to reduce its balance sheet's credit risk. Using a synthetic balance-sheet CDO, the bank can achieve that result without selling the assets.

Funding -- cash vs. synthetic

- *Cash CDOs* involve a portfolio of cash assets, such as loans, corporate bonds, asset-backed securities or mortgage-backed securities. Ownership of the assets is transferred to the legal entity (known as a special purpose vehicle) issuing the CDO's tranches. The risk of loss on the assets is

divided among tranches in reverse order of seniority. Cash CDO issuance exceeded \$400 billion in 2006.

- *Synthetic CDOs* do not own cash assets like bonds or loans. Instead, synthetic CDOs gain credit exposure to a portfolio of fixed income assets without owning those assets through the use of credit default swaps, a derivatives instrument. (Under such a swap, the credit protection seller, the CDO, receives periodic cash payments, called premiums, in exchange for agreeing to assume the risk of loss on a specific asset in the event that asset experiences a default or other credit event.) Like a cash CDO, the risk of loss on the CDO's portfolio is divided into tranches. Losses will first affect the equity tranche, next the mezzanine tranches, and finally the senior tranche. Each tranche pays a periodic payment (the swap premium), with the junior tranches offering higher yields.

A synthetic CDO tranche may be either funded or unfunded. A funded tranche requires investors to fund their credit exposure. Under the swap agreement, the tranche could have to pay up to a certain amount of money in the event of a credit event on assets in CDO's reference portfolio. This credit exposure is funded at the time of investment by the tranche's investors. Typically, the junior tranches that face the greatest risk of experiencing a loss have to fund their exposure. At maturity, the funding minus any realized losses is returned to investors. In contrast, senior tranches are usually unfunded since the risk of loss is much lower. Unlike a cash CDO, investors in a senior tranche receive periodic payments but do not place any capital in the CDO when entering into the investment. Instead, the investors retain continuing liability exposure and may have to make a payment to the CDO in the rare event the portfolio's losses reach the senior tranche. Funded synthetic issuance exceeded \$80 billion in 2006. From an issuance perspective, synthetic CDOs take less time to create. Cash assets do not have to be purchased and managed, and the CDO's tranches can be precisely structured.

- *Hybrid CDOs* are an intermediate instrument between cash CDOs and synthetic CDOs. The portfolio of a hybrid CDO includes both cash assets as well as swaps that give the CDO credit exposure to additional assets.

Single-tranche CDOs

The flexibility of credit default swaps is used to construct Single Tranche CDOs (bespoke CDOs) where the entire CDO is structured specifically for a single or small group of investors, and the remaining tranches are never sold but held by the dealer based on valuations from internal models. Residual risk is delta-hedged by the dealer.

Variants

Unlike CDOs, which are terminating structures that typically wind-down or refinance at the end of their financing term, Structured Operating Companies are permanently capitalized variants of CDOs, with an active management team and infrastructure. They often issue term notes, commercial paper, and/or auction rate securities, depending upon the structural and portfolio characteristics of the company. Credit Derivative Products Companies (CDPC) and Structured Investment Vehicles (SIV) are examples, with CDPC taking risk synthetically and SIV with predominantly 'cash' exposure.

Types of CDOs

The two main types of CDOs are:

- Collateralized loan obligations (CLOs) -- CDOs backed primarily by leveraged bank loans.

- Structured finance CDOs (SFCDOs) -- CDOs backed primarily by asset-backed securities and mortgage-backed securities (In 2006, 54% of CDOs were backed by structured finance and 35% were backed by leverage loans [3])

Other types of CDOs include:

- Commercial Real Estate CDOs (CRE CDOs) -- backed primarily by commercial real estate assets
- Collateralized bond obligations (CBOs) -- CDOs backed primarily by corporate bonds
- Collateralized Insurance Obligations (CIOs) -- backed by insurance or, more usually, reinsurance contracts
- CDO-Squared -- CDOs backed primarily by the tranches issued by other CDOs.
- CDOⁿ -- Generic term for CDO³ (CDO cubed) and higher, where the CDO is backed by other CDOs/CDO²/CDO³. These are particularly difficult vehicles to model due to the possible repetition of exposures in the underlying CDO.

Types of Collateral

The collateral for cash CDOs include:

- Structured finance securities (mortgage-backed securities, home equity asset-backed securities, commercial mortgage-backed securities)
- Leveraged loans
- Corporate bonds
- Real estate investment trust (REIT) debt
- Commercial real estate mortgage debt (including whole loans, B notes, and Mezzanine debt)
- Emerging-market sovereign debt
- Project finance debt
- Trust Preferred securities

Transaction Participants

Participants in a CDO transaction include investors, the underwriter, the asset manager, the trustee and collateral administrator, accountants and attorneys.

Investors

Investors have different motivations for purchasing CDO securities depending on which tranche they

select. At the more senior levels of debt, investors are able to obtain better yields than those that are available on more traditional securities (e.g. corporate bonds) of a similar rating or credit profile. They also benefit from the diversification of the CDO portfolio and the expertise of the asset manager. Investors include banks and insurance companies as well as investment funds. Junior tranche investors achieve a leveraged, non-recourse investment in the underlying diversified collateral portfolio. Mezzanine and equity tranches offer yields that are not available in many other fixed income securities. Risk is higher and one can sometimes say 'unknown' as the gyrations of the CDO manufacturing process obscure defects in the model or assumptions. Investors include hedge funds and wealthy individuals.

Underwriter

The underwriter, typically an investment bank, acts as the structurer and arranger of the CDO. Working with the asset management firm that constructs the CDO's portfolio, the underwriter structures debt and equity tranches including selecting the debt-to-equity ratio, sizing each tranche, establishing coverage and collateral quality tests, and working with the credit rating agencies to gain the desired ratings for each debt tranche.

Other responsibilities include working with a law firm and creating the special purpose legal vehicle (typically a trust incorporated in the Cayman Islands) that will purchase the assets and issue the CDO's tranches. In addition, the underwriter will work with the asset manager to determine the post-closing trading restrictions that will be included in the CDO's prospectus. Such restrictions outline how and when the asset manager can sell an asset and limit the ability of the asset manager to change the asset class or credit rating composition of the portfolio at different times during the life of the CDO. An audited prospectus is prepared for investors.

The final step is to price the CDO (e.g. set the coupons for each debt tranche) and place the tranches with investors. The priority in placement is finding investors for the risky equity tranche and junior debt tranches of the CDO. It is common for the underwriter and asset manager to retain a piece of the equity tranche. This is often at the behest of investors in the CDO as equityholders have an economic incentive in ensuring that the CDO performs well. In addition, the underwriter is generally expected to provide some type of secondary market liquidity for the CDO.

According to Thomson Financial, the top underwriters are Bear Stearns, Merrill Lynch, Wachovia, Citigroup, Deutsche Bank, and Bank of America Securities. CDOs are more profitable for underwriters than conventional bond underwriting due to the complexity involved. The underwriter is paid a fee when the CDO is issued.

The Asset Manager

The asset manager often has broad discretion to purchase and/or trade collateral and plays a key role in each CDO transaction even after the CDO is issued. An experienced manager is critical in both the construction and maintenance of the CDO's portfolio. The manager can maintain the credit quality of a CDO's portfolio through trades as well as maximize recovery rates when defaults on CDO assets occur.

The asset manager's role begins before the CDO is issued. Months before a CDO is issued, a bank will usually provide financing to enable the manager to purchase some of the collateral assets that may be used in the forthcoming CDO in a process called warehousing.

Even by the issuance date, the asset manager often will not have completed the construction of the CDO's portfolio. A "ramp-up" period following issuance during which the remaining assets are purchased can extend for several months after the CDO is issued. For this reason, some senior CDO notes are structured as delayed drawdown notes, allowing the asset manager to drawdown cash from investors as collateral purchases are made.

The asset manager's role continues even after the ramp-up period ends. During the CDO's "reinvestment period", which usually extends several years past the issuance date of the CDO, the asset manager is authorized to reinvest principal proceeds from maturing assets in the CDO's portfolio. Within the confines of the trading restrictions specified in the CDO's prospectus, the asset manager can also make trades to maintain the credit quality of the CDO's portfolio. The manager's prominent role throughout the life of a CDO underscores the importance of the manager and his or her staff.

There are approximately 300 asset managers in the marketplace. Some collateral managers are active whilst some are nothing more than placebos where the investor will be at risk to the underlying portfolio. Asset Managers make money by virtue of the senior fee (which is paid before any of the CDO investors are paid) and subordinated fee as well as any equity investment the manager has in the CDO, making CDOs a lucrative business for asset managers. These fees, together with underwriting fees, administration {approx 1.5 - 2%} by virtue of capital structure are provided by the equity investment, by virtue of reduced cashflow.

See also: List of CDO Managers

The Trustee and Collateral Administrator

The trustee holds title to the assets of the CDO for the benefit of the noteholders. In the CDO market, the trustee also typically serves as collateral administrator. In this role, the collateral administrator produces and distributes noteholder reports, performs various compliance tests regarding the composition and liquidity of the asset portfolios in addition to constructing and executing the priority of payment waterfall models. Two notable exceptions to this are Virtus Partners and Wilmington Trust Conduit Services, a subsidiary of Wilmington Trust, which offer collateral administration services, but are not trustee banks. In contrast to the asset manager, there are relatively few trustees in the marketplace. The following institutions currently offer trustee services in the CDO marketplace:

- The Bank of New York (note: the Bank of New York recently also acquired the corporate trust unit of JP Morgan which is the market share leader)
- HSBC
- LaSalle Bank (note: operates in Europe under the name of its parent, ABN AMRO)
- Wells Fargo
- Deutsche Bank
- US Bank (note: US Bank recently also acquired the corporate trust unit of Wachovia)
- Fortis Intertrust (note: was formerly known as MeesPierson Intertrust)
- BNP Paribas Securities Services (note: currently serves the European market only)
- Wilmington Trust Company
- Sanne Trust
- State Street Corporation
- Virtus Partners (four partners split off from the former JPMorgan Trust shop to create a start up)