Deutsche Bank

March 21, 2000

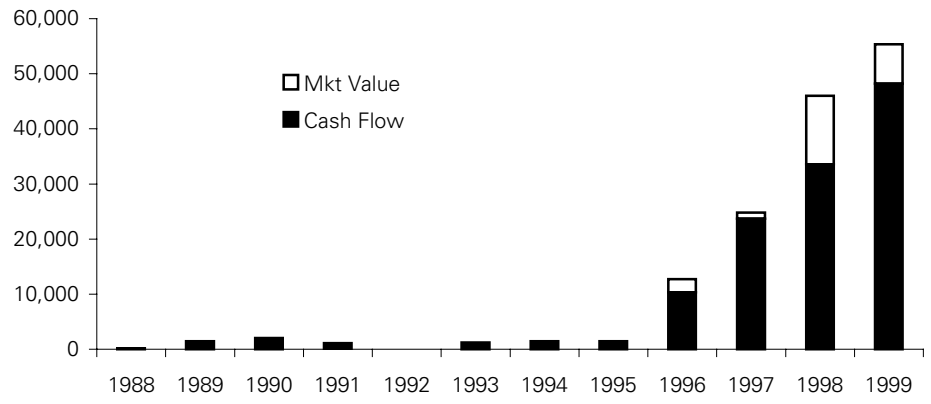
The Arbitrage CDO Market

Cash flow & market value CDOs lead the way

Table of Contents

- Collateralized debt obligations have been around for over a decade, but it has only been in the past three years that issuance volume has jumped significantly, from about $20 billion to over $100 billion. Issuance has soared due to investor demand and innovation.
- There are two basic types of CDOs – balance sheet CDOs, which are done by banks for regulatory capital purposes, and arbitrage CDOs, where high yielding collateral is securitized and financed by relatively low cost investment grade bonds.
- A key sector of the market today is arbitrage CDOs backed by US-issued high yield assets, otherwise known as CBOs. These transactions account for about 55% of total CDO volume but nearly 75% of deals.
- Cash flow CDOs are structured so that investment grade bonds can withstand the worst default experience seen over the past 30 years without suffering losses. Market value CDOs are structured so that investment grade bonds backed by below investment grade assets can withstand multiples of the worst historic price volatility.
- CDO bonds carry credit risk similar to comparably rated corporate bonds, but offer substantially wider spreads across the credit spectrum.

Arbitrage CDO Issuance Activity (USD mn)



Source: DB Global Markets Research

Nichol Bakalar
(212) 469 8362
nichol.bakalar@db.com

Markus Herrmann
(49) 69 9103 8314
(44) 171 547 2748
markus.herrmann@db.com

John F. Tierney
(212) 469 6795
john.tierney@db.com

David Folkerts-Landau
Managing Director, Head of
Global Markets Research

Introduction: Lay of the land

CDO activity took off in 1996 as investors sought yield and innovation flourished

Collateralized debt obligations (CDOs) are structured securities backed by diversified pools of bank loans, high yield corporate bonds, emerging market securities, or various types of mortgage securities. The first collateralized bond obligation (CBO) was issued in 1988, but this product really started to flourish in 1996 as investors sought yield in a low rate and spread-compressed environment and issuers adapted the structuring technology to new asset types (see Figure 1). In that year, issuance soared to about $20 billion after being well under $5 billion for a number of years. Also supporting the boom in issuance in 1996 was the strong risk-adjusted performance of the high yield market during the early 1990s, which helped investors become more comfortable with the underlying collateral of CDOs. Issuance climbed rapidly to over $90 billion in 1998, and reached $103 billion in 1999.

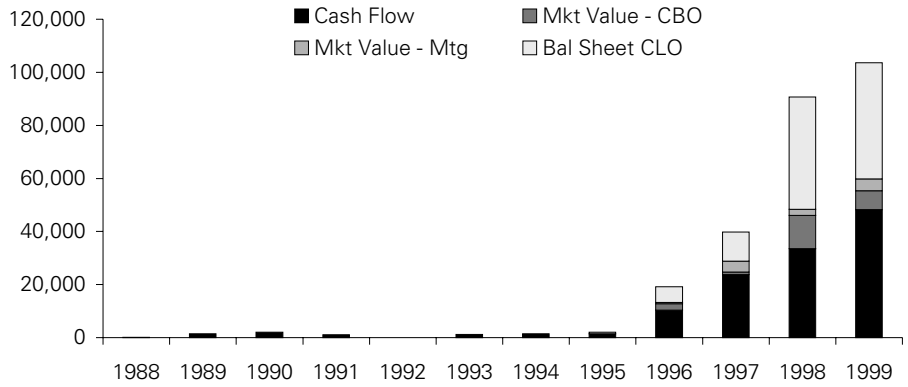
These products have been successful in recent years because they offer both higher yields than comparably rated investment alternatives, and diversification through access to financial assets and money management expertise that would otherwise not be available to many investors. At the same time, sponsors and managers have been enthusiastic proponents of CDOs because they provide an efficient means to increase assets under management, and because the structuring technology can be adapted to a wide variety of collateral and business purposes.

There are two basic types of CDOs – balance sheet and arbitrage transactions

The CDO market can be distilled down to two basic products – arbitrage and balance sheet transactions. Arbitrage transactions seek to capture excess spread from securitizing diversified pools of high yielding below investment grade loans or securities, and financing them largely through issuing relatively low cost investment grade debt. Arbitrage CDOs may be either cash flow or market value transactions. Cash flow transactions are structured so that investment grade CDO bonds can withstand the worst default experience of the past 30 years without suffering losses. Market value CDOs are structured so that investment grade CDO bonds can withstand multiples of the worst historic price volatility without suffering losses.

Balance sheet transactions, on the other hand, are motivated by regulatory arbitrage. They have been done by banks seeking capital relief by moving high quality but low yielding loan assets off balance sheet. These products are known as balance sheet collateralized loan obligations (CLO).

Figure 1: CDO Issuance Activity ($ millions)



Source: DB Global Markets Research, rating agency reports

In terms of issuance activity arbitrage CBOs/CLOs have accounted for 65% - 75% of deal activity and about 50 – 60% of dollar volume in recent years, with balance sheet CLOs making up the remainder. Within the arbitrage sector, cash flow transactions dominate, with a market share near 75%. US high yield securities are the primary collateral in arbitrage transactions. In 1997 and 1998 before the Russian default, emerging markets collateral was used in some 25 transactions totaling $7.1 billion. Since then there have been only a few emerging markets CDO transactions as investors continue to be concerned about potentially high default rates and extreme market value volatility.

This report focuses on arbitrage CDOs, particularly those backed by US high yield debt

This report focuses on arbitrage CDOs, particularly those backed by US high yield debt. In the next section, we describe the basics of how cash flow CDOs are structured, and review how the rating agencies analyze these transactions. We then do the same for market value CDOs. While there are many similarities between cash flow and market value CDOs, differences in how they are structured, managed, and rated warrant a separate discussion for each one. We then discuss these products from a relative value perspective, with emphasis on issues that investors new to this sector should consider. Finally we conclude with a brief discussion of emerging issues and products that CDO investors may see in the coming year. The appendix provides a summary and comparison of key characteristics of arbitrage cash flow and market value CDOs.

Cash Flow CDOs: Managing Default Risk

Cash flow arbitrage CDOs account for over 60% of CDO transactions and 40% of CDO volume

The mainstay of the CDO market is the cash flow arbitrage CDO using US high yield bonds or highly leveraged syndicated bank loans. During the past two years, these transactions have accounted for roughly 40 - 45% of issuance volume but 60 - 70% of total CDO transactions.[1]

Cash flow CDOs are similar to many other types of asset backed securities in that they are created by setting up a special purpose vehicle (SPV) that issues debt securities to investors. The proceeds of the sale are used to acquire collateral assets, which are held by the SPV on behalf of the bondholders. The debt securities are able to achieve ratings above the credit quality of the collateral through use of diversified collateral pools, senior/subordinated structures, or surety wraps from third party financial insurers. Senior bondholders have minimal credit risk as evidenced by triple-A or double-A ratings but the expected return on their holdings is generally less than the underlying collateral. On the other hand, subordinated classes have a leveraged exposure to credit risk, and offer substantially wider spreads than the underlying collateral.

CDOs provide for active management of the collateral pool and regular investor updates about the portfolio

Cash flow CDOs differ in one key respect from other types of ABS, in that they provide for a collateral manager who has some discretion to actively manage the collateral portfolio. Investors receive a monthly or quarterly report providing an update of the portfolio composition and performance. With most other ABS, the collateral pool is static, meaning that once it is established at the beginning of the transaction it does not change, other than due to prepayments, amortization or defaults. The sponsor cannot replace or substitute new collateral.[2] Consequently, investors in arbitrage CDOs must incorporate into their due diligence process not only an analysis of the collateral and structure, but also the qualifications and abilities of the asset manager. As we shall see, this feature provides unique risk and return opportunities for investors.

Cash flow transactions are structured so that the collateral pool generates sufficient stated interest and principal cash flows to cover debt service requirements on the rated liabilities as long as the securities held as collateral avoid high levels of default. To protect bondholders against high defaults, these transactions must meet ongoing overcollateralization and interest coverage tests and portfolio criteria or be subject to early termination.

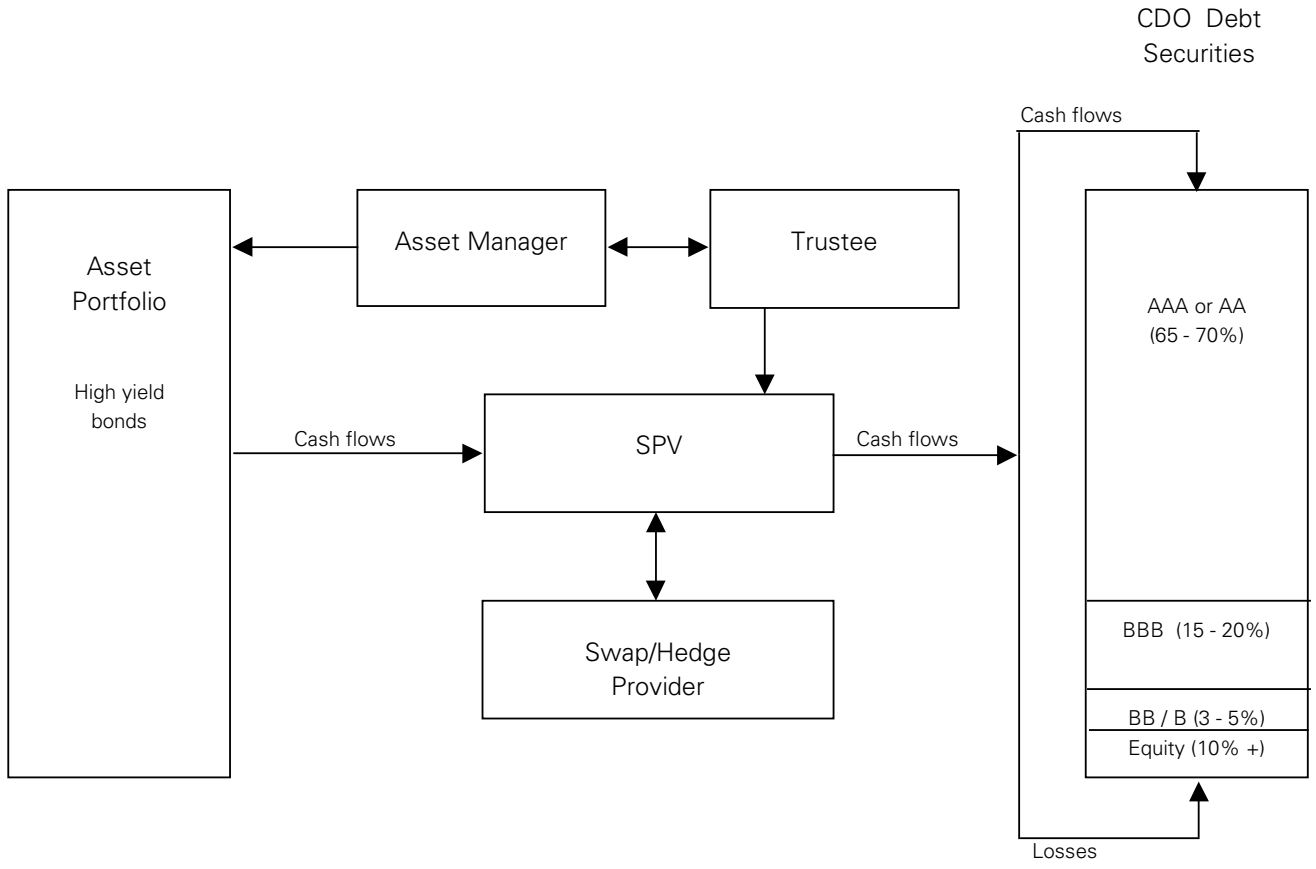
Cash Flow CDO Structure: How the Parts Fit Together

Figure 2 lays out the components of a representative cash flow CDO structure. We discuss each of these components in the sections below.

[1] Strictly speaking transactions using syndicated bank loans are usually called arbitrage CLOs. Throughout this report we use the term CDO or CBO to refer to both arbitrage cash flow CBOs and CLOs.

[2] A limited exception is structures that securitize revolving accounts such as credit card receivables. Here, an asset manager continually uses repayments to purchase new receivables throughout the life of the transaction, but these are generally from accounts that were initially transferred to the ABS transaction. The manager cannot "trade" accounts held by the trust.

Figure 2: Cash Flow CDO Transaction Diagram



Source: DB Global Markets Research

Asset Portfolio

The asset portfolio is made up of relatively high yielding, noninvestment grade bonds. In a typical US high yield transaction, the bond assets in the collateral pool often have an average rating in the high to mid single-B range. While many cash flow CDOs have been done using primarily US high yield bonds as collateral, some transactions may provide for other types of collateral including:

- G7 country high yield bonds
- Other OECD country high yield bonds
- Emerging market debt
- US and non-US bank loans
- Credit derivatives
- Mezzanine debt

The three stages in the life of a CDO: ramp-up, reinvestment, and repayment

The asset portfolio in a typical CDO transaction goes through three stages. First is the ramp-up period. During the first three to six months, the asset manager acquires bond assets until the transaction is fully invested and fully funded. The second stage is the reinvestment or revolving period. During this period, which may run from four to eight years, interest payments from the collateral are passed through to bondholders, while principal repayments are reinvested in new assets. At the end of the reinvestment period, principal repayments are passed through to bondholders beginning with the most senior class until all outstanding bonds have been repaid.

Typically the collateral matures before the stated final to minimize mark to market shortfalls

The asset portfolio must meet a variety of diversification and structural requirements at inception and on an ongoing basis. For example, the pool will have to maintain a minimum average rating and (if the transaction is rated by Moody's), a minimum diversity score (we discuss diversity scores below in the section on rating CDOs). In addition, there are likely to be concentration restrictions such as a maximum of 2% for a single obligor, and a maximum of 8 - 12% in any one industry. As a result, CDO portfolios are more diversified than the overall high yield market. The pool may also be subject to a minimum coupon requirement, to ensure there is sufficient interest cash flows to meet debt service requirements. There is also often a requirement that most or all collateral securities mature before the stated final maturity date of the transaction to minimize risk of mark-to-market shortfalls at maturity. Lastly, there may be restrictions or limits on certain types of securities that can be held. If the CDO can invest in emerging market debt, a limit may be placed on countries and amounts that can be included. Or there may be limits on a CDO's ability to invest in securities issued by other CDOs, and in synthetic or credit linked notes, especially those that incorporate significant leverage.

If the asset portfolio fails to meet these criteria during the term of the transaction, any subsequent trades by the asset manager must either maintain or improve the portfolio's measurement criteria.

The asset portfolio in a cash flow CDO transaction is not subject to an ongoing mark-to-market requirement. The transaction is structured such that cash flows from the assets are sufficient to pay interest and repay principal on all classes of bonds over the life of the transaction as long as there are no defaults. Investment grade bonds can withstand high levels of collateral defaults without suffering losses.

Debt Securities

Cash flow CDOs have fairly simple structures, with 3 or 4 classes of debt securities

Most cash flow CDOs have a relatively simple senior/subordinated capital structures. The SPV issues three or four classes of debt securities with ratings ranging from triple-A to single-B. These securities often have legal final maturities about 10 to 12 years after issuance, although the expected average life is about 6 to 8 years for the senior class and 8 to 10 years for the mezzanine and subordinated classes. The rated notes are frequently callable after three to five years at the option of the equity class holders at the greater of par or a make-whole provision. The interest rate on the bonds may be either fixed rate or floating rate. Frequently the collateral will consist of fixed rate bonds or a mix of fixed rate and floating rate bonds. The senior securities of a CDO are usually floating rate while mezzanine and subordinated securities may be either fixed or floating. The SPV will enter into interest rate swaps or caps to hedge against any mismatch between collateral cash flows and debt service requirements.

The rating agencies determine how much debt can be issued at each rating level, based on an analysis of the collateral portfolio. In a typical transaction, the senior class accounts for 65% - 75% of the capital structure. The senior class may carry a triple-A rating based solely on internal credit enhancement (i.e., subordination, where the mezzanine and subordinated classes provide a buffer against credit losses in the collateral portfolio). Alternatively internal credit enhancement may be used to achieve a double-A rating, and a surety wrap to reach a triple-A level. The subordination level required to achieve a triple-A rating is substantially higher than most other ABS asset classes, and reflects the credit risk of the collateral and the relatively long term of these transactions.

The remaining debt classes are relatively small. A structure may have either a single-A and triple-B class mezzanine class, or both. The mezzanine class(es) accounts for 10 – 20% of a typical cash flow CDO. The or lowest rated tranche is frequently rated either low double-B or single-B, and accounts for 5% or less of the transaction.

The equity or nonrated class is often about 10% of the capital structure in a US high yield transaction. If the collateral pool can include emerging market securities or distressed securities, or if it is not well diversified, the rating agencies may require a larger equity class to provide credit support for the rated bond classes.

Credit Enhancement

Cash flow CDOs must meet several coverage tests on an ongoing basis

In addition to substantial credit enhancement in the form of subordination, cash flow CDOs include overcollateralization and interest coverage triggers to protect bondholders if defaults are relatively high. If these triggers are breached, interest cash flows from the collateral must be diverted from more junior classes to pay down the senior notes until coverage tests are met. Any deferred interest is repaid with accrued interest in the future to the respective noteholders to the extent sufficient excess spread is available.

Overcollateralization Test – The overcollateralization or par value test requires that the collateral portfolio exceed the rated bonds by minimum percentages that vary by class. In a structure with three classes of rated debt, a typical set of ratios might be 125% for the senior class, 108% for the mezzanine class, and 100% for the lowest rated class. The senior class O/C ratio test equals the sum of the face amount of the outstanding collateral in the pool divided by the outstanding face amount of the senior class. The mezzanine class O/C ratio is calculated as the face amount of collateral divided by the sum of the senior and mezzanine bonds, while the lowest rated class O/C ratio is the outstanding collateral divided by the sum of all three debt classes.

Figure 3: Applying the overcollateralization test

		At Inception			After $8 Loss		Pay Down Class A	
			O/C Ratio					
		Par Value	Required	Actual	Par Value	O/C Ratio	Par Value	O/C Ratio
Class A	AAA	68	125%	147%	68	135%	57	142%
Class B	BBB	18	108%	116%	18	107%	18	108%
Class C	B	4	100%	111%	4	102%	4	102%
Equity	NR	10			2		2	
		100			92		81	

Source: DB Global Markets Research

A simple example:

Let's consider a simple example. Figure 3 shows overcollateralization levels at inception for the representative CDO structure in Figure 2 along with representative required O/C levels. It can be seen that the overcollateralization ratios are higher than required (147% for the triple-A class versus required level of 125%, and 116% versus 108% for the mezzanine class). Now assume defaults result in a net loss of $8, reducing the face value of the collateral portfolio from 100 to 92 and the nonrated equity class from 10 to 2. The mezzanine class O/C level is now only 107%. To meet the 108% overcollateralization requirement, interest cash flows must be diverted from the subordinate class to pay down first the senior class then the mezzanine class. In this example, the transaction satisfies the minimum coverage requirements once the senior class is paid down to 57 (a decline of 11). Deferred interest is repaid to the Class C noteholders out of excess spread once the overcollateralization tests are satisfied. Note that if there are further defaults it will be necessary to pay down additional senior and/or mezzanine bonds.

Interest Coverage Ratio Test - The interest coverage ratio is designed to ensure that the collateral pool generates sufficient interest cash flows to service the outstanding debt. Typical minimum interest coverage ratios in a structure similar to our example above would be 140% for the senior class, 125% for the mezzanine class, and 100% for the subordinate class. Interest coverage ratios for each class are calculated by dividing the total interest generated by the collateral by the amount of interest required to pay expenses and service each class of debt plus all classes above it.

Asset Manager

The asset manager's job is to avoid defaults

The manager is employed by the CDO and is chosen based on a proven fund management track record. The manager in a cash flow CDO is responsible for acquiring assets for the collateral pool, monitoring the performance of the pool to ensure that it is meeting asset quality and coverage tests, and reinvesting principal proceeds from the collateral during the revolving period. If the collateral pool fails to meet minimum pool requirements (e.g., diversity, issuer concentration, average coupon and rating), any subsequent transactions must either maintain or improve the pool characteristics.

Above and beyond all, the collateral manager is responsible for selecting securities and managing the collateral portfolio so as to minimize exposure to defaults and associated losses. The manager is not required to mark the collateral portfolio to market, but must ensure that the transaction can generate cash flows to meet obligations to bondholders.

The manager has latitude to trade 10% - 20% of the collateral portfolio each year

The cash flow CDO manager has some latitude to actively manage the collateral portfolio. The manager can sell without limitation credit risk securities and credit improved securities that have appreciated in price. A credit risk security is one that in the manager's opinion is declining in credit quality and could possibly fall into default. A credit improved security is one that has experienced credit rating upgrades or is watch listed for an upgrade. In addition, the manager is typically allowed to trade between 10% to 20% of the outstanding collateral at the beginning of each year of the reinvestment period to allow the manager to realize gains, reposition the portfolio to take advantage of market or relative value views, or to improve compliance with the prescribed asset quality or coverage tests.

The manager is typically paid an annual fee. About one-half to two-thirds of the fee is a senior obligation of the CDO transaction, senior to or pari passu with, the senior bondholders. The balance is subordinated to the rated bondholders, and is either senior to or pari passu with the equity class. In addition the manager usually holds 10% to 40% of the equity in the transaction, which ensures the manager's interests are closely aligned with the noteholders.

Hedging/swap Counterparty

The issuer will usually enter into hedging agreements to remove any interest rate, currency or timing risk between payments received on the collateral and those paid to investors. Hedging is important in a CDO transaction as the collateral securing these structures is often made up largely of fixed-rate, semi-annual pay securities and payments to CDO noteholders may be quarterly or semiannually, and are often on a floating-rate basis.

Trustee

As with other types of asset backed securitizations, the trustee is responsible for ensuring that the transaction is performing as intended and as documented in the offering circular or prospectus. This includes seeing that interest cash flows and principal repayments are properly distributed to the bondholders, ensuring the swap counterparty(ies) meet any minimum rating or collateralization requirements, and monitoring the collateral portfolio to ensure that it meets ongoing diversity and coverage ratio requirements. The trustee also monitors the performance of the asset manager, and may have to approve transactions in the collateral portfolio.

Cash Flow Waterfall for Cash Flow CDOs

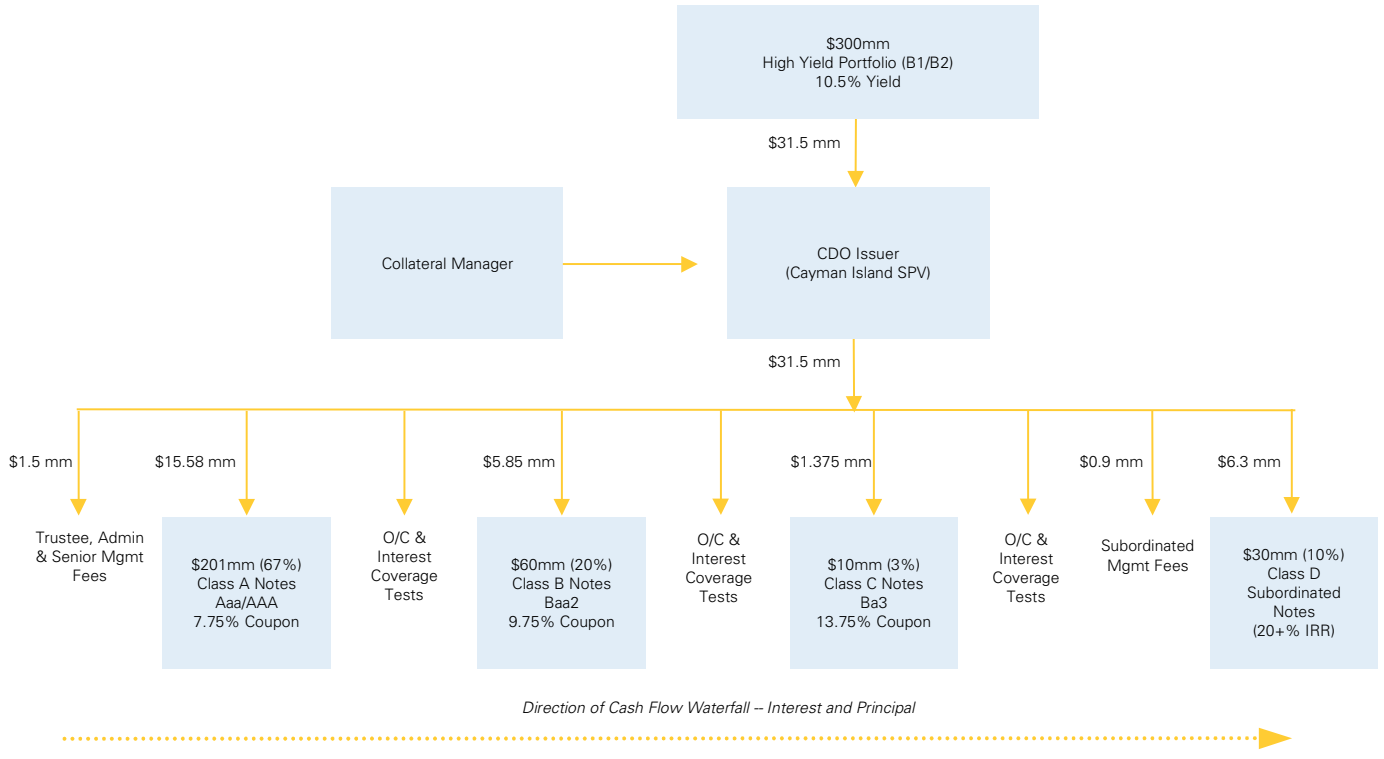
The cash flow waterfall follows a straightforward sequential pattern

The cash flow waterfall for cash flow CDOs is straightforward. Figure 4 presents an example for a representative structure. The most senior obligation is administrative fees and part of the manager's fee, after which cash flows are distributed sequentially to bondholders. In this example, the subordinated portion of the manager's fee is paid after all bondholders have been paid current and deferred interest, but before the equity holder is paid.

During the reinvestment period, coupon cash flows from the collateral are distributed to bondholders, and principal cash flows are reinvested in new collateral securities. If the structure fails to meet the overcollateralization tests, then interest cash flows are diverted from more junior classes to pay down senior bonds until the transaction is in compliance. Any deferred interest is repaid out of future cash flows when available. Note that this obligation is senior to claims of more junior bondholders and equity holders.

During the principal repayment period, principal cash flows are distributed to bondholders sequentially as the collateral bonds mature or are called. Interest cash flows continue to be distributed as described above.

Figure 4: Cash Flow Waterfall for Cash Flow CDO



Source: DB Global Markets Research

Rating Cash Flow CDOs

The rating agencies focus on collateral portfolio credit quality and asset manager qualifications

All four of the major rating agencies have developed methodologies to rate cash flow CDOs.[3] While each agency's approach differs in certain respects, they are broadly similar. In this section, we focus on the basic approach, drawing where appropriate on specific examples from different rating agencies. In rating a CDO, the key factors are the credit

[3] The rating agencies are Moody's Investors Service, Standard & Poor's, Fitch IBCA, and Duff & Phelps Credit Rating Co.

and cash flow characteristics of the asset pool, the qualifications of the asset manager, and the legal infrastructure of the transaction.

Credit Quality of the Collateral Portfolio

Cash flow CDOs generally use a senior-subordinated structure to issue debt securities with ratings well above the average rating of the collateral portfolio. The rating agencies determine the amount of credit enhancement (subordination / overcollateralization and interest coverage ratios) required to support various rating levels. In a cash flow CDO, the rating agencies focus on default risk in the collateral portfolio, and the ability of the portfolio to service outstanding rated debt issues, i.e., to generate cash to pay interest and repay principal over the life of the transaction.

Credit enhancement levels reflect expected losses on the collateral

The key element of the rating agency's credit analysis is the level of expected loss on collateral portfolio. Expected loss is a function of the probability of default and loss severity associated with defaults. For example, if the probability of default is 5% and the loss rate upon default is 60% of par (implying a recovery rate of 40%), then the expected loss is 3% (5% * 60%). Several factors enter into determining the expected loss of a portfolio, including the rating and diversity of the assets, timing of defaults, and expected recoveries. The collateral pool is then stressed using a cash flow model, and credit enhancement levels are established for each rated debt class based on the risk characteristics of the pool and the desired rating.

All the rating agencies have developed extensive databases of the credit performance of their rating universes over long periods of time, which provide benchmarks for analyzing default risk and the probability of default across rating categories. Moody's, for example, has provided extensive documentation of default activity in its rating universe in its annual publication on historical default rates.[4]

The weighted average rating of the collateral and the diversity of the pool together determine its probability of default. Each asset must be rated by the rating agency either publicly or in "shadow" form, either through analysis of the bond, or by relying on ratings from another agency. These shadow ratings are usually subject to additional haircuts so they are effectively rated one or two notches lower than if the agency had done its own full-scale rating analysis. A weighted average rating is calculated based on the asset's size and a rating factor that corresponds to the asset's rating (see Figure 5 for sample rating factors). The relationship between ratings and ratings factors is clearly nonlinear, reflecting the increasing default risk at lower rating categories.

Figure 5: Moody's Rating Factors for CDO Pool Analysis

Aaa/AAA	1	Baa1/BBB+	260	CCC+	NA
Aa1/AA+	10	Baa2/BBB	360	Caa/CCC	6500
Aa2/AA	20	Baa3/BBB-	610	CCC-	NA
Aa3/AA-	40	Ba1/BB+	940	<Ca/<CCC-	10000
A1/A+	70	Ba2/BB	1350		
A2/A	120	Ba3/BB-	1780		
A3/A-	180	B1/B+	2220		
		B2/B	2720		
		B3/B-	3490		

Source: Moody's Investors Service

[4] For Moody's most recent study, see *Historical Default Rates of Corporate Bond Issuers, 1920 – 1999*, Moody's Investors Service, January 2000.

To ensure diversity, many CDOs limit any one obligor to 2 – 3% of the collateral pool

Diversity is an important factor in rating CDOs. Since obligors from the same industry will be affected by similar economic and industry specific factors, it is important to analyze not only the number of obligors but also dispersion across industries and, in the case of emerging market collateral, across countries. The rating agencies prefer to see restrictions such as a maximum of 2 - 3% of the pool in any one obligor, and a maximum of 8 - 12% in any one industry. Each agency has defined some 25 – 40 distinct industries for this purpose. If the pool allows higher concentrations, or is relatively small, causing the pool to be lumpy, the rating agencies will apply additional haircuts, resulting in higher credit enhancement levels. A well-diversified CDO will have over 100 bonds in the collateral portfolio and a minimum Moody's diversity score of 40 or better.

Moody's has quantified the analysis of diversity by developing its diversity score concept. The Moody's method attempts to capture industry-related correlation by grouping obligors into 33 industries and assigning a score to each industry that reflects the number and relative sizes of obligors by industry (see Figure 6). The pool diversity score is the sum of the scores for each industry. For example, if a pool includes 20 equal sized obligors across 20 different industries then the score for each industry is 1, and the pool diversity score is 20. If, however, the 20 obligors are distributed evenly in size and number across 10 industries, the second obligor in each industry contributes only an additional 0.5 to the diversity score or 1.5 for each industry and therefore the total diversity score is 15. Moody's interprets the diversity score of a pool as the equivalent of the number of equal sized, independent positions in the pool. If the pool contained 100 bonds of various sizes and the pool had a diversity score of 35, Moody's would treat it as 35 equal sized, uncorrelated bonds for purposes of analyzing the credit risk of the pool.[5]

Figure 6: Moody's Diversity Score Framework

No. firms in same industry	Diversity Score	No. firms in same industry	Diversity Score
1	1.00	7	3.25
2	1.50	8	3.50
3	2.00	9	3.75
4	2.33	10	4.00
5	2.67	> 10	Case-by-case analysis
6	3.00		

Source: Moody's Investors Service

Defaults are front loaded in stress tests

In their stress tests, each rating agency distributes expected defaults over time. To be more conservative the defaults are front-loaded in the analysis, to minimize the amount of time that the collateral portfolio is able to generate interest cash flows. Assumptions about the timing of the recoveries on defaulted assets depend on the liquidity of the collateral. S&P assumes that recoveries on defaulted bonds occur one year after default while recoveries on defaulted loans occur over a three year workout period.

Loss severity of an asset is directly tied to the seniority of the asset in the issuer's capital structure. According to Moody's, senior secured bank debt has an average recovery rate of about 70%, while senior unsecured debt is about 49%.[6] But for stress test purposes, the rating agencies haircut these expected levels. Recovery rates for senior secured loans are assumed to be in the 50 – 60% range, and about 35 – 40% for senior unsecured debt.

[5] For more information about Moody's diversity score framework, see *Rating Cash Flow Transactions Backed by Corporate Debt: 1995 Update*, Moody's Investor Service, April 7, 1995

[6] See *Historical Default Rates of Corporate Bond Issuers, 1920 – 1999*, Moody's Investors Service, January 2000

Asset Manager Qualifications

The rating agencies focus on the qualifications of the asset manager, since a key factor in cash flow CDO transactions is the ability of the manager to identify and avoid potential default situations. The rating agencies review the manager's track record in running portfolios in the style required by the CDO, its trading facilities, credit research capabilities, and back office infrastructure. They also evaluate members of the management team, including background checks, to ensure there is sufficient depth to withstand employee turnover over the term of the transaction.

Legal and Administrative Infrastructure

Finally, the rating agencies review the legal and administrative structure of the transaction. This includes a due diligence review of the trustee and its ability to perform duties required by the CDO, an analysis of any hedging agreements and counterparties, and an analysis of the SPV to ensure that it is structured to be bankruptcy remote, i.e., it can not be forced into bankruptcy by third parties seeking to attach assets in the collateral pool. One feature of many ABS transactions – ensuring that the transfer of assets to the SPV is a true sale – is often not necessary in cash flow CDOs if the assets are to be acquired in the capital markets.

Market Value CDOs: Managing Price Risk

Market value CDOs have great trading leeway, but also strict overcollateralization requirements

In 1995, the first market value CDOs were issued. Market value CDOs are also arbitrage transactions that take advantage of the wide spread differential between noninvestment and investment grade yields, but unlike cash flow CDOs, the performance of the structure is based on the mark-to-market performance of the collateral pool. Market value transactions have been relatively few in number, accounting for about 15% of CDO transactions. But transaction sizes are large, in the $500 million - $1.5 billion range, versus $200 – 500 million for cash flow CDOs. These large transactions are due to strong demand by investors for access to the asset managers involved in market value CDOs.

Market value CDOs provide for considerably more leeway for active management than cash flow CDOs, allowing managers to take advantage of relative value opportunities and to respond to mark-to-market fluctuations in a timely manner. Managers also are able to invest in a broader range of assets than cash flow CDOs. Consequently the investor assumes exposure to the investment and trading skills of the manager. But an offsetting factor is that market value CDO debt often has a low correlation with many other asset classes due to the diversified nature of the collateral portfolio.

To protect the investors' interests, market value CDOs must meet ongoing overcollateralization tests. The collateral in a market value CDO is marked to market frequently – typically weekly. The market value of the collateral must exceed the par amount of debt outstanding after giving effect to advance rates (or haircuts) applied to the market value of the assets. These advance rates are calculated by the rating agencies based on, among other things, historic price volatilities of the different asset types. If the haircut collateral values are less than par value of the debt outstanding the portfolio will be subject to partial or full liquidation. The appendix summarizes and compares key characteristics of cash flow and market value CDOs.

Market value CDO: Putting the Parts Together

The general structure of a market value CDO is similar to the cash flow CDO portrayed in Figure 2, and includes a collateral portfolio, an asset manager, a trustee, swap/hedge counterparties, and debt securities issued to investors. In our discussion below we focus on the differences between cash flow and market value CDOs.

Market value CDOs often contain a broader range of collateral than cash flow CDOs

Asset Portfolio

A market value CDO often contains a broader range of collateral than a cash flow CDO. The primary requirement is that it can be marked to market in the capital markets on a regular basis. Distressed debt, for example, may be included if the manager believes it has little further downside price risk but offers upside depending on the outcome of bankruptcy proceedings. Collateral may include:

- US domestic high yield bonds
- G7 country high yield bonds
- Other OECD country high yield bonds
- US and non-US bank loans
- Credit derivatives
- Mezzanine debt
- Convertible debt
- Preferred securities
- Distressed debt
- Emerging market debt
- Equities

The manager has discretion to breach minimum diversity requirements

Market value CDOs are also subject to minimum diversity requirements both in terms of issuer and industry. Because of the active management element of these transactions market value CDOs may permit a greater degree of concentration than cash flow CDOs. For example, sample portfolio limitations could include:

- Maximum of 3.5% per issuer
- Maximum of 15% in any single industry
- Maximum of 25% in special situation investments
- Maximum of 15% in illiquid investments
- Maximum of 25% in foreign issuers and 7.5% in unhedged foreign investments
- Maximum of 5% in CDO securities

Unlike cash flow CDOs, the asset manager may have some discretion to breach these limits although this activity cannot be financed with rated debt. In effect, the advance rate is 0% (or a haircut of 100%).

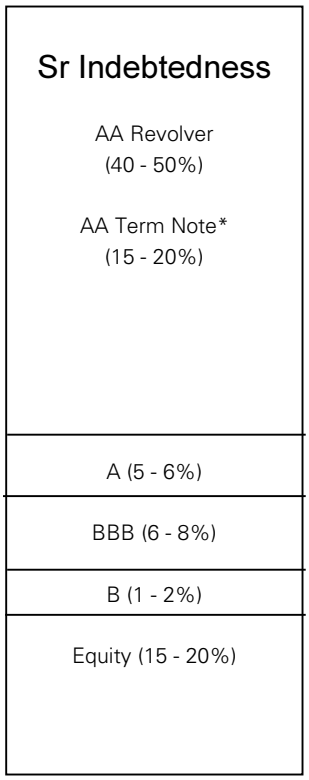
Debt Securities

As with cash flow CDO, market value transactions are driven by arbitrage – the difference between the yield and total return on the mostly below investment grade collateral and the ability to finance much of this portfolio with much lower cost investment grade debt securities.

The senior class of a market value CDO includes a revolving credit facility

However, because of the mark-to-market feature and ongoing overcollateralization requirements, the capital structure (debt securities issued to investors) for a market value CDO differs in several respects from a cash flow CDO (see Figure 7). The most senior class includes a revolving loan facility that can be drawn down or repaid at any time. This gives the collateral manager flexibility to ramp up the portfolio over time or to sell assets and pay down debt to meet overcollateralization requirements. The senior revolving class typically accounts for roughly one-half of the capital structure. There is an additional senior term note that ranks *pari-passu* with the revolving facility and accounts for an additional 10% - 20% of the capital structure. The senior class(es) frequently carry a stand-alone double-A rating but the term note may be wrapped to a triple-A level using a surety policy. The senior class (revolver and term debt combined) accounts for 60% to 70% of the capital structure. There are typically three or four additional mezzanine and subordinate debt classes that carry ratings from single-A to single-B. The debt in recent market value deals has been rated by Standard & Poor's, Moody's, and Fitch IBCA.

Figure 7: Capital Structure of a Typical Market Value CDO



**The term note may be wrapped to obtain a triple A rating. The revolver and term note are ranked pari passu in the capital structure.*
Source: DB Global Markets Research

Advance rates are based on the historical price volatility of the asset

The collateral manager's ability to issue rated debt to finance the collateral portfolio is limited by rating agency-determined advance rates – the proportion of the purchase price (and ongoing market value) that can be financed by issuing rated debt securities to investors. The remainder must be funded with equity. The table below summarizes advance rates established by Moody's and Fitch IBCA for a variety of asset classes and debt ratings. For example, if the fund purchases double-B rated high yield debt, it is only able to borrow 77% against the market value of that asset (i.e., a 23% haircut). Each of the rating agencies has a unique method for calculating advance rates. Fitch analyzes the historic volatility of price indices most comparable to the underlying asset in the fund. For example, the BT Leveraged Loan Index is used as a proxy for bank loans. Fitch then applies stress tests in the form of multiples of the worst monthly decline in the history of the index to set advance rates for different ratings, with higher ratings being required to withstand higher multiples of historic declines.

Figure 8: Advance Rates for Market Value CDOs

	AAA	AA	A	BBB	BB	B
Cash Equivalents	100	100	100	100	100	100
Gov't Securities: 2Y - 10Y	95	95	95	95	95	100
Bank Loans w. MV > 90%	86	90	91	93	94	96
Investment Grade Corporate Bonds	85	88	91	94	94	96
Bank Loans w. MV 80 - 90% /BB-/Ba3 Corp Debt*	73	81	87	90	92	92
Bank Loans w. MV 70 - 80% /BB-/Ba3 Corp Debt**	69	75	85	87	89	89
Other Bank Loans / CCC+ or lower Corp. Debt	52	60	72	79	85	82
Investment Grade Convertibles	60	70	80	85	80	90
Noninvestment Grade Convertibles	52	64	76	81	78	88
Equity, Illiquid Debt	40	50	71	78	78	85

**Priced by approved source*
***Not priced by approved source*
Source: Moody's, Fitch IBCA

A consequence of this advance rate approach is that the equity or nonrated class is usually larger in market value CDOs than in cash flow CDOs. To some extent this reflects the broader range of collateral that may be included in a market value CDO and the greater concentration risk that may exist from time to time. But the primary factor is to provide a cushion against price volatility.

Credit Enhancement

Credit enhancement in a market value structure is provided by market value overcollateralization tests and certain portfolio limitations. The manager must satisfy these tests on an ongoing basis, if necessary by liquidating assets or restructuring the collateral portfolio.

The market value of the collateral must exceed the par amount of debt outstanding by specified ratios

Overcollateralization test - *The overcollateralization test* is similar to overcollateralization in cash flow transactions, but is driven by changes in the market value of the collateral rather than changes in book value due to defaults. A manager is required to maintain a minimum ratio of collateral market value relative to the par amount of debt outstanding. These ratios are driven by the advance rates associated with each class of debt and each asset type. If a market value trigger is breached – that is, the market value of the collateral has declined relative to the debt outstanding - the manager must cure the problem within a short period (e.g., 10 business days). This is usually accomplished by selling assets and paying down debt, or perhaps by selling lower advance rate assets and replacing them with higher advance rate assets. Otherwise the entire collateral portfolio may be subject to liquidation to repay outstanding debt. This liquidation requirement is a form of credit enhancement and is designed to ensure that debt holders, especially those with more senior standing, are repaid before the market value of the collateral pool deteriorates significantly. In effect, any losses due to liquidating assets are borne first by the equity holders then the debt holders in reverse order of seniority.

The minimum net worth test Is applied quarterly

Minimum net worth test – This test, which is applied quarterly, is designed to ensure a minimum amount of equity is maintained in the structure. The goal is to measure total change in the portfolio's asset value (both realized and unrealized) since closing the transaction. Minimum net worth (MNW) ratios are calculated as the market value of equity divided by the amount of paid in capital or original equity, where the market value of equity is the market value of assets less the par amount of debt. Minimum net worth ratios vary by different classes of rated debt. For example, the MNW ratio could range from 60% for the senior class to 30% for the subordinated class. At any test date, the relevant MNW ratio is for the senior-most debt class outstanding. If the MNW test is triggered, the senior-most debtholders can elect whether to initiate a liquidation of the portfolio.

Trading restrictions - Market value CDOs often have some discretionary ability to exceed defined concentration limits. For example, if the collateral pool is restricted to 5% per issuer, an asset manager could exceed that limit to take advantage of a relative value opportunity or credit outlook. But in general, any holdings above the defined limits must be financed with equity as opposed to rated debt. In other words, the advance rate is effectively 0% for purposes of the overcollateralization tests.

Asset Manager

As with a cash flow CDO, the quality of the asset manager is a critical component of the transaction. Given the nature of a market value CDO, the asset manager must have a proven ability to manage the total return performance of a wide variety of assets through differing market environments, and to operate within the market value tests of the transaction. Market value CDO managers form an elite club. To date, there are only about ten managers of market value transactions, compared to well over 100 cash flow CDO managers.

Rating Market Value CDOs

Collateral Portfolio

The key issues for the rating agencies is the price volatility of the collateral portfolio rather than default risk, and the ability of the asset manager. Default risk is also important, of course, but this is captured in the price volatility analysis since even defaulted securities generally trade at deeply discounted prices reflecting ultimate recovery expectations.

Price volatility stress tests are based on historical experience and include additional haircuts when appropriate

The rating agencies have developed price histories going back up to 15 years for US high yield bonds, and five to seven years for emerging market debt. These periods have encompassed a very broad range of market environments, including economic booms, recessions, broad-based financial market collapses (e.g., stock market crash in 1987, Russian default in 1998), periods of poor liquidity, and major breakdowns in trading relationships between normally uncorrelated sectors. In cases where the rating agencies do not believe their price histories cover a full menu of possibilities, they will apply haircuts to existing price histories to introduce a greater level of potential stress and variability. Based on these price histories and additional stress tests, the rating agencies have developed advance rate tables for a wide range of securities across the rating spectrum (see Figure 8).

In their stress tests, the rating agencies may take into account fluctuations in interest rates, changes in default rates, variations in liquidity conditions, and changes in correlations among different asset classes. They also evaluate the diversity of the collateral portfolio, and apply haircuts if the collateral portfolio is not considered well diversified.

Asset Manager Qualifications

The asset manager's performance is stressed by removing largest gains to check for consistency

As with cash flow CDOs, assessment of the asset manager is a key component of the rating agency analysis. The rating agencies focus on the manager's track record in managing assets and its investment style to verify that it is consistent with the investment objectives of the market value CDO transaction. The asset manager's performance is stressed by removing largest gains to check for consistency. The manager's trading, credit research and back office capabilities are checked to ensure there is sufficient depth and experience to manage the transaction over its life.

Legal and Administrative Infrastructure Analysis

The evaluation of the legal and administrative infrastructure is similar to that for a cash flow CDO.

Risk & Return: Relative Value Considerations

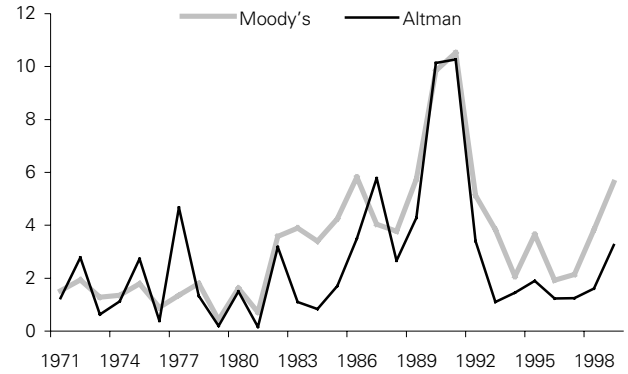
Arbitrage CDOs offer substantially more spread than most other comparably rated investment alternatives, including corporate bonds and CMBS. In large measure this reflects investor concerns about the credit risk inherent in the underlying collateral and volatility in default activity over time, although liquidity is also a factor. In this section we review how investment grade CDO bonds are structured to withstand extremely high levels of default in the collateral pool (certainly by historical standards), and the returns available for taking CDO risk.

Corporate default rates peaked in the early 90s

There is little question that high yield corporate bonds are risky. Figure 9 summarizes annual default rates for the US high yield market published by Moody's and Edward I. Altman, a prominent academic observer of the high yield market.[7] Default rates peaked in 1991 during the recession of the early 90s, when the Moody's and Altman universes hit 10.53% and 10.27%, respectively. Since then, high yield defaults fell sharply to roughly 2% by 1997, then rose again in the aftermath of the 1997 Asian crisis and 1998 Russian default.

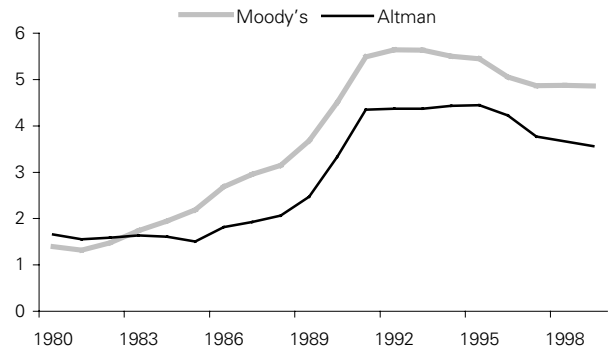
For CDO investors, the more relevant measure is the average annual default rates over the term of a CDO transaction rather than worst case one-year default rates. Figure 10 summarizes default risk over time as 10-year moving average annual default rates beginning with the 10-year period ending in 1980.[8] The 10-year moving average default rate peaked in 1992-93 at 5.6% and 4.4% for Moody's and Altman, respectively.

Figure 9: Annual High Yield Default Rates



Source: DB Global Markets Research

Figure 10: 10Y Moving Average Default Rate



Source: DB Global Markets Research

Investment grade CDOs easily withstand the worst default experience of the past 30 years

How are cash flow CDOs structured to withstand this risk? Figure 11 summarizes a breakeven analysis of a cash flow CDO structure similar to transactions that Deutsche Bank has completed recently. In this example the collateral has an average rating between B1 and B2. The middle column is the per annum breakeven default rate required for each class to sustain a loss.[9] The triple-A and double-A classes are able to withstand annual defaults of 29.4% and 19.4% over the life of the transaction,

[7] See *Historical Default Rates of Corporate Bond Issuers, 1920 – 1999*, Moody's Investors Service, January 2000; and Altman, Edward I., et al, *Defaults and Returns on High Yield Bonds: Analysis Through 1998 and Default Outlook for 1999 – 2001*, NYU Salomon Center, January 1999

[8] Measuring default rates over time is something of an art, and is affected by assumptions about which bonds are included in the universe, grace periods, timing of issuance and defaults. For our purposes, we have calculated arithmetic averages of Moody's and Altman's annual data.

[9] This analysis assumes a 50% recovery rate immediately after default occurs.

respectively, both considerably higher than the worst one-year high yield experience reported by Moody's (10.53%). The triple-B class is also well insulated against default risk, with a breakeven rate of 11.4%. On the other hand, the B1 class, with a breakeven default rate of 5.2%, has more exposure to losses. As history shows, one-year rates have risen above this level from time to time so 10-year moving average default rates are more important in gauging risk of sustaining losses. Over much of the past 20 years (apart from the early 1990s) this structure would have had a reasonable chance of not experiencing losses. Still, it is apparent that subinvestment grade investors in CDOs must carefully weigh the risks associated with the structure, collateral and the economic outlook against potential returns.

Figure 11: Breakeven Default Rates for a Representative Cash Flow CDO

Average Rating: B1/B2
Diversity Score: 45
Final Maturity: 12 years
Reinvestment Period: 5 years

				Avg life (yrs) @ default rates	
		Size	Loss occurs at per annum default rate of	0%	6%
Class A	AAA	70%	29.4%	9.2	8.4
Class B	Aa2	13%	19.4%	10.8	11.2
Class C	Baa2	6%	11.4%	11.4	11.8
Class D	B1	11%	7.0%	11.8	12.1
		100%			

Source: DB Global Markets Research

CDO investors are well compensated to assume CDO credit risk across the rating spectrum

In evaluating an investment, the other dimension, of course, is return. Relative to other investments with similar credit risk, CDO investors in 1999 were well compensated to assume CDO credit risk across the credit spectrum, but these premiums have shrunk somewhat in early 2000. In Figure 12 we compare indicative spreads for cash flow CDOs, CMBS (another high yielding sector), and industrial corporates (a benchmark for the credit sector).

Focusing first on CMBS, investment grade CDO spreads have been consistently wider than comparably rated CMBS. In the triple-A sector, most AAA CDO issuance is floating rate, so the most appropriate comparison is with fixed rate CMBS asset-swapped to floating. The spread difference between CDOs and CMBS widened from about 13 bp in July 1999 to 23 bp by yearend on heavy supply in the CDO market, but returned to 13 bp at the end of February. A similar dynamic occurred on the fixed rate side. In the triple-B sector (fixed rate) the relationship between CDOs and CMBS was stable during late 1999, but CDOs widened relative to CMBS in early 2000. Interestingly, one factor behind the recent strong performance of triple-B CMBS reportedly has been buying interest by sponsors accumulating collateral for real estate-related CDO offerings. Pricing for single-B offerings in both the CMBS and CDO sectors can vary widely from deal to deal depending on the collateral and market conditions, but we believe both sectors tend to trade in low 800 bp range.

Investors receive a significant spread premium to invest in single-B CDO tranches instead of single-B bonds

CDOs offer significantly more spread than straight industrial corporate bonds across the credit spectrum. On a fixed rate basis, at yearend 1999 triple-A CDOs yielded about 90 – 100 bp more than AAA corporates, while the spread differential widened to about 216 bp at the triple-B level. Spreads have since tightened some 25-40 bp. But most significant spread differentials are in the single-B sector. While spreads for single-B bonds have been in the 450 - 600 bp range during the past eight months, CDO single-Bs have been

above 800 bp.[10] If we assume that the rating agencies have assigned single-B ratings such that a single-B corporate bond and a single-B CDO class have similar expected loss levels, then clearly high yield investors are receiving a significant 200 – 300 bp premium to assume single-B corporate credit risk in CDO form versus acquiring and managing their own high yield portfolios.

Figure 12: Recent Comparative Monthend Spreads Levels (bp)

			Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00
Floating	CDO	AAA	60	68	66.5	66.5	66.5	62.5	57.5	55
	Spread to CMBS	AAA	13	21	19.5	19.5	23.5	23.5	19.5	13
Fixed	CDO	AAA	165	172.5	172.5	172.5	162.5	162.5	157.5	157.5
		BBB	325	350	355	355	355	355	347.7	332.5
		B	800	875	837.5	775	825	825	812.5	805
	CDO vs	AAA	18	17.5	29.5	37.5	39.5	43.5	34.5	14.5
	CMBS	BBB	83	97	105	105	110	147	157.7	126.5
	CDO vs.	AAA	91	86.5	95.5	102.5	88.5	96.5	95.5	71.5
	Corporates	BBB	178	197	198	199	202	216	208.7	176.5

Source: DB Global Markets Research, Bloomberg

[10] The pricing and spreads on single-B rated bonds varies widely depending on specific sector and outlook for individual companies. In the current market a diversified portfolio of single-B bonds would have a weighted average spread of about 500 – 525 bp.

Emerging Issues and Alternative CDO Sectors

After a very strong finish last year, the arbitrage CDO market has reached something of a crossroads as the new millennium opens. Issuance of high yield CDOs has been muted during the first two months of 2000, largely because the arbitrage in these transactions evaporated. There are two primary reasons for this. First, spreads tightened somewhat in the high yield market as investors put Y2K-related liquidity concerns behind them. But more importantly, the widening of swap spreads made it more expensive to create floating rate CDO tranches.[11] While spreads on CDO tranches have tightened somewhat, this hasn't been sufficient to offset tighter collateral spreads and wider swap spreads. Another factor that has weighed on the market was the rise in high yield defaults last year. We think this experience reflected the weak global economy following the Asian crisis and Russian default and a spate of weak issues a few years ago, and that defaults will moderate in the coming year. Higher defaults have not scared off investors, as evidenced by tighter CDO spreads, but it has made investors more selective about the structure of transactions and the quality and experience of the manager.

In short, the arbitrage CDO market is experiencing some growing pains, partly because of external factors (such as an inverted Treasury yield curve and a volatile swaps market), and partly due to high yield market factors. Going forward, it may continue to be difficult to create arbitrage CDOs at the rate seen in 1999 because the high concentration of telecom issues in high yield market will place a ceiling on the volume of diversified structures that can be created, and because investors are clearly becoming more selective about managers. But this probably bodes well for the quality of CDOs that do come to market.

But adverse conditions often give rise to new innovations and developments, and we expect the coming year will bring a number of new opportunities. Below we summarize a number of emerging products that could see growing issuance activity.

European CDO / CDO market: investor appetite larger than supply to date

CDO activity in Europe to date has been mostly balance sheet CLOs or CDOs by banks seeking to restructure balance sheets and improve regulatory capital ratios. There have been no arbitrage transactions to date that use European based assets exclusively. In large measure this is because the high yield bond market in Europe is still in a nascent stage of development. But that will change as the European high yield market grows, and as market conditions in the US motivate sponsors to find suitable assets for new transactions.

Still, there has been considerable demand by European investors for US and international arbitrage CDOs, due to their attractive spreads. In many cases European investors are able to purchase Euro-denominated tranches of CDO transactions originated in the US or internationally. In other cases, regulated European investors that have limited ability to invest in non-European assets, such as insurance companies, have been able to purchase CDOs through repackaging transactions.

An example of this is the Asset-Repackaging Trust B.V. (ART). ART will buy the desired CDO securities and issue a series of repackaged notes with each note backed by a specified pool of collateral, and a specific swap. The noteholders of a specific series of ART have a claim only on the assets on which their notes are secured. Moreover, the

[11] We noted earlier that while most higher rated CDO bonds are floating rate, the collateral is often fixed rate. The SPV enters into interest rate swaps to exchange fixed coupons for floating coupons that are passed through to investors. As swaps spreads widen relative to spreads on the collateral, the fixed rate that the trust must pay rises, resulting in lower net floating proceeds. This in turn hurts the arbitrage in the transaction.

notes can be issued in registered form (e.g., a credit-linked Schuldschein), with the advantage that a Schuldschein does not need to be marked to market by certain investors.

Market value mortgage CDOs

The market value mortgage CDO was created in 1995 when Pegasus I came to market. Since then some 17 additional transactions totaling some $14 billion have been done, most of them in the past 18 months. Market value mortgage CDOs represent yet another type of hybrid security – one that essentially converts agency mortgage security risk (interest rates and prepayments) into credit risk.

Market value CDOs and mortgage CDOs are similar in that the performance of both are critically dependent on the ability of the asset manager, and both entail distributing credit risk across a range of structured securities with different ratings and different exposures to credit risk. They differ in that the collateral for market value CDOs is generally below investment grade securities, while in a market value mortgage CDO the collateral is mortgage securities, usually triple-A rated agency pass-throughs and CMOs. Normally structured securities backed by agency mortgage securities entail redistributing mortgage risk (interest rate and prepayment risk) to different classes, but credit risk (i.e., risk of losing principal) is not a factor. A mortgage CDO is a different animal. The performance of the collateral in a mortgage CDO is driven ultimately by interest rates and prepayments, but the structuring technique entails effectively recasting this risk into credit risk. Investors assess their exposure to credit risk through the credit ratings assigned to each class.

Real estate and ABS CDOs

More recently, there have been CDO structures using real estate debt as collateral. These transactions repackage relatively cheap REIT debt and mezzanine and subordinated classes of CMBS transactions as CDOs. Another variation on this theme is the prospect of CDOs backed by subordinate ABS bonds. These transactions may become more common if investors in subordinated classes of ABS, who are typically buy-and-hold, begin to reduce their holdings or need to restructure their portfolios, e.g., to maintain duration, thereby creating pools of relatively cheap collateral.

Synthetic CDOs

A synthetic CDO is a securitization of credit default swaps. In these transactions, investors in the CDO are effectively selling protection to the sponsor of the transaction. The supply of this kind of product will depend on whether the CBO market can provide protection at a lower cost than other credit derivative market players, and whether credit derivative dealers are facing an imbalance between protection buyers and sellers.

Appendix: Cash Flow vs. Market Value CDOs

Comparison of Cash flow and Market Value CDOs

	Cash Flow	Market Value
Security	• Secured by high yield asset cash flows	• Secured by high yield asset market value
Collateral Manager	• Attempts to minimize defaults • Emphasis on credit, liquidity is a secondary concern	• Attempts to maximize total return and minimize portfolio price volatility • Emphasis on relative value
Funding of Structure	• Usually term senior floating rate notes and fixed or floating mezzanine and subordinate notes. Could have revolving credit facility	• Commercial paper conduit program or revolving credit facility and term floating/fixed rate notes (senior, mezzanine and subordinate
Maturity and Amortization	• 10 – 15 years to final maturity; callable after 3 to 5 years • Average life expected to be 6 to 8 years for senior class; longer maturity for other classes • Amortization usually begins in years 5 to 8, after the reinvestment period, as underlying collateral amortizes or is repaid	• 5 – 8 years to final maturity • Manager has discretion to draw down and repay credit facility • Term notes have bullet maturities
Credit Enhancement	• Generally 15-25% subordination below senior class • Overcollateralization test • Interest coverage ratio test	• Generally 20-30% subordination below senior class • Market value overcollateralization • Minimum net worth of equity
Credit Protection/Remedies	• If coverage tests fail, cash flow is diverted from mezzanine and subordinate classes to senior notes. There are no forced liquidations	• If overcollateralization tests fail, liquidations of collateral may be required to pay down debt and bring overcollateralization levels back in line
Overcollateralization	• Measured on basis of portfolio par value and contractual interest payments to be received • Monitored at least monthly	• Measured on basis of portfolio market value adjusted by advance rates • Monitored weekly or bi-weekly using third party valuations from independent sources
Focus of Rating Agencies	• Based upon stressed default scenarios and expected recovery of the collateral • Asset manager	• Based upon stressed price volatility assumptions of the collateral • Asset manager
Disadvantages of Structure	• Not suited for non-cash paying collateral such as zero-coupon or distressed securities.	• May be forced to sell collateral into a poor market because of market value declines (effectively margin calls)
Trading within Structure	• Limited	• Very flexible

Source: DB Global Markets Research

Bibliography

Altman, Edward I.,et al, *Defaults & Returns on High Yield Bonds: Analysis Through 1998 and Default Outlook for 1999 – 2001*, NYU Salomon Center, January 1999

Duff & Phelps Credit Rating Co., *DCR Criteria for Rating Cash Flow and Market Value CBOs/CLOs*, September 1997

Fitch IBCA, *Management of CBOs/CLOs*, December 8, 1997

Fitch IBCA, *Leveraged Loans Weather the Storm*, September 18, 1997

Fitch IBCA, *CBO/CLO Rating Criteria*, March 17, 1997

Fitch IBCA, *Market Value CBO/CLO Rating Criteria*, June 1, 1999

Moody's Investors Service, *Rating Cash Flow Transactions Backed by Corporate Debt – 1995 Update*, April 7, 1995

Moody's Investors Service, *The Binomial Expansion Method Applied to CBO/CLO Analysis*, December 13, 1995

Moody's Investors Service, *The Relative Stability of Cash-flow vs Market Value CDO Ratings*, December 18, 1998

Moody's Investors Service, *Moody's Approach to Rating Market-Value CDOs*, April 3, 1999

Moody's Investors Service, *1998 Review/1999 Outlook: Rapid Growth Continues Despite the Emerging Markets Crisis*, January 15, 1999

Moody's Investors Service*, Historical Default Rates of Corporate Bond Issuers, 1920 – 1999* January 2000

Moody's Investors Service, *1999 First Quarter CDO Review: The Year Gets off to a Flying Start,* April 9, 1999

Moody's Investors Service, *1999 Second Quarter CDO Review: Market Unfazed by an Uptick in High Yield Defaults,* July 23, 1999

Moody's Investors Service, *1999 Third Quarter CDO Review: Volume Declines as Investor Worries Spoil the Party,* October 22, 1999

Moody's Investors Service, *1999 CDO Review/2000 Preview: Year Ends with a Bang and Promise of Further Growth in 2000*, January 28, 2000

Moody's Investors Service, *1999 Review of Collateralised Debt Obligations and Outlook for 2000: The European Boom?,* February 10, 2000

Standard & Poor's, *Standard & Poor's CBO/CLO Model*, Standard & Poor's Structured Finance, February 1998

Standard & Poor's, *Global CBO/CLO Criteria: Market Innovations*, Standard & Poor's Structured Finance, May 1998

Notes

Notes

Notes

Main Offices

London
Winchester House
1 Great Winchester Street
London EC2N 2DB
United Kingdom
Tel: +44 171 545 8000

Frankfurt
Grosse Gallusstrasse 10-14
60311 Frankfurt
Germany
Tel: +49 69 9100-0

New York
31 West 52nd Street
New York, NY 10019
United States of America
Tel: +212 469 5000

Hong Kong
55/F, New World Tower
2 Queen's Road, Central
Hong Kong
Tel: +852 2203 8888

Sydney
Grosvenor Place
Level 18,225 George Street
Sydney NSW 2000
Australia
Tel: +612 9258 1661

Singapore
5 Temasek Boulevard
#08-01 Suntec Tower Five
Singapore 038985
Tel: +65 224 4677

Tokyo
12-1, Toranomon 3-chome
Minato-ku, Tokyo 105
Japan
Tel: +813 5401 1986

Global Markets Research

David Folkerts-Landau
Managing Director, Head of Global Markets Research
Winchester House, 1 Great Winchester Street, London EC2N 2DB, UK
Tel: +44 171 545 5502 Fax: 547 6379

Peter Garber, Global Strategist
Stuart Parkinson, Senior Economist

Credit Research
Glenn Reynolds, Global Head
31 West 52nd Street, New York, NY 10019, US
Tel: +1 212 469 4526 Fax: 469 2727

Fixed Income and Relative Value Research
David Knott, Global Head
1 Great Winchester Street
London EC2N 2DB, UK
Tel: +44 171 545 4017 Fax: 545 2794

Peter Petas, Chief Emerging Markets Strategist

Foreign Exchange Research
Michael Rosenberg, Global Head
31 West 52nd Street, New York, NY 10019, US
Tel: +1 212 469 4776 Fax: 469 7209

Investment Banking Research and Strategy
Abraham Gulkowitz, Chief Global Strategist
130 Liberty Street, Mailstop 2101
New York, NY 10006, US
Tel: +1 212 250 5404 Fax: 250 1118

Economic Research
James Barty, Chief European Equities Economist
Ulrich Beckmann, Co-Head of Euroland Economics
Marcel Cassard, Chief Economist, Emerging Europe, Middle East & Africa
Ivan Colhoun, Chief Economist, Australia/New Zealand
Peter Hooper, Chief Economist, US
Atsushi Mizuno, Chief Economist & Strategist, Japan
Carlo Monticelli, Co-Head of Euroland Economics
Liliana Rojas-Suarez, Chief Economist, Latin America
Ulf Schoefisch, Chief Economist, New Zealand
Andrew Spence, Chief Economist, Canada
Michael Spencer, Chief Economist, Asia

Deutsche Bank

Global Markets **Global Markets** **Global Markets**

Publication Address:
Deutsche Bank AG London
Winchester House
1 Great Winchester Street
London EC2N 2DB

Internet:
http://research.gm.db.com
Ask your usual contact for a username and password.