

Moody's Approach to Rating Multisector CDOs

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CONTENTS

- Summary
- Overview: Motivation For Multisector CDOs
- Measuring Diversity
- Assessing Credit Quality: Default And Recovery Rates
- Assessing Cash-Flow Characteristics
- Conclusion
- Appendixes I-IV

SUMMARY

The inclusion of an increasingly broad range of assets in Collateralized Debt Obligation (CDO) collateral pools poses several analytical challenges. To analyze diversification within a multisector CDO, Moody's has established Asset Backed Securities (ABS), Mortgage Backed Securities (MBS) and CDO sector classifications in addition to those for existing corporate industries.

Within this classification scheme, Moody's makes explicit assumptions about the default correlation between assets to calculate a "diversity score," a key determinant of credit enhancement. In addition, Moody's recognizes that the loss severity of a structured security varies by asset type, credit rating and position within the capital structure. For asset types that are prepayment sensitive, maturity shortening or extension risk due to faster or slower prepayment speed must be examined.

Several structural innovations have been developed for multisector CDOs. For example, to deal with the issue of the longer Weighted Average Life (WAL) of the CDO liabilities (which may result from long-maturity collateral), many multisector deals include a step-up provision whereby the issuer is required to pay a hefty margin to junior liability holders some years out. This gives the issuer a strong incentive to call the deal prior to maturity, effectively shortening the WAL. Another feature in some transactions is an option for the collateral manager to defease the deal earlier than expected if the collateral performs very well. This again provides the manager with the flexibility to unwind the transaction prior to maturity.

The CDO has emerged as an alternative vehicle for repackaging assets. As long as the spreads on structured debt remain relatively wide, and while the interest in reducing regulatory and economic capital costs is present, we expect to see a stable flow of multisector transactions. Ultimately, this additional source of demand for structured debt should spur the issuance of more ABS, MBS and CDOs.

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OVERVIEW: MOTIVATION FOR MULTISECTOR CDOs

For more than a decade, participants in the CDO market have exploited the opportunity to achieve arbitrage gains by securitizing illiquid high-yield bonds and leveraged loans. More recently, they have turned their attention to the securitization of other illiquid instruments. In some cases, the focus has been on even less liquid corporate bonds and loans, such as true private placements or middle-market loans. In other cases, structured securities have become prime candidates for inclusion in CDO collateral pools.

The spreads over Libor or other benchmarks for these less liquid instruments widened sharply in Autumn 1998, when nearly all nongovernment security markets endured severe dislocations. In the case of structured debt, spreads are still wide enough to fuel “resecuritization” transactions, in which structured instruments are repackaged via CDOs. Indeed, Moody’s has already rated numerous transactions of this type.¹

Choosing Collateral for Multisector CDOs²

ABS and MBS

Nearly all types of ABS and MBS have found their way into the collateral pools of resecuritization CDOs.³ The senior tranches of asset-backed transactions such as credit card and auto loan deals, as well as those of residential mortgage transactions, are somewhat liquid and trade at tight spreads to Libor. However, the junior tranches of nearly all ABS and MBS transactions are considerably more illiquid and trade at a discount to like-rated corporate bonds, making them attractive candidates for inclusion in arbitrage-oriented CDOs. Newer transaction types, such as securitizations of mutual fund fees, structured settlements, future flows, etc. also lack liquidity, even at the senior-tranche level. Most Commercial MBS (CMBS) tranches are also illiquid. Public deals are generally more liquid, while 144A private placement transactions are often less so, and “private private” (neither 144A nor Regulation S) transactions are still less liquid.

CDOs

Like the less standard forms of ABS, CDO tranches trade infrequently and thus carry a liquidity premium. This tends to be true of all but the senior-most (typically **Aaa**-rated, floating-rate) tranches. Thus nonsenior arbitrage CDO tranches are also good candidates for resecuritization transactions. CDOs backed by more “exotic” collateral, such as emerging-market debt, are particularly illiquid.

with static, single-sector transactions, multisector CDOs facilitate diversification within the collateral pool. In addition, like nearly all CDOs, these transactions are structured to permit reinvestment and at least a limited degree of trading flexibility, providing collateral managers with the ability to manage credit risk and maintain leverage to enhance equity returns. Originators of these CDOs are also able to structure liabilities with desirable characteristics such as predictable duration.⁵

The Balance Sheet Motivation

Banks and other financial institutions may sponsor resecuritizations — regardless of where current spreads stand — to remove structured securities from their balance sheets. They do this via “balance sheet” Collateralized Loan Obligations (CLOs). The ABS or MBS tranches that are ripe for resecuritization would typically be the retained portions of transactions underwritten and/or sponsored by the banks. Here, the motivation is not to achieve spread arbitrage, but rather to free up regulatory and economic capital or to obtain alternative funding sources.

CDOs Provide Flexibility

Until recently, the repackaging of structured securities has been applied mainly to a single asset class, and often to a static pool of securities. Examples include ReRemic (Resecuritization of Real Estate Mortgage Investment Conduit) transactions backed by a static pool of subordinated CMBS, or by a static pool of RMBS.

But through the application of CDO analytics, several multisector resecuritizations have been completed over the past year.⁴ In comparison

1 In addition to a large number of mortgage market-value transactions, Moody’s has rated the following cash-flow deals backed by structured assets (including REIT debt): Loch Ness (ABS), Ben Nevis One (ABS), Fortress (CMBS, REIT debt), DASH I and DASH II (ABS), ZING 1 and ZING 2 (CDOs), SABRE (ABS), Bleecker (ABS), Talon (ABS), Equinox (CDOs), Phoenix (ABS), INGRESS (ABS), MACH ONE (CMBS, REIT debt, RMBS), SFA (ABS), PPM (ABS), Diversified REIT Trust 1999-1 and 2000-1 (REIT debt), a private CDO of CDOs, Beacon Hill (ABS), St. George Funding (diversified structured debt) and two credit default swap transactions backed by ABS.

2 A description of the type of information that is helpful in evaluating the characteristics of the collateral pool is contained in Appendix IV.

3 Some of the deals may also have some exposure to REIT debt.

4 Single-sector repackaging has also been achieved through CDOs.

5 During the reinvestment period, subject to the satisfaction of collateral guidelines, principal proceeds may be reinvested. This allows a CDO to maintain its leverage over a longer period of time. The reinvestment feature is especially useful if the collateral is likely to amortize quickly. Limited trading flexibility is common in CDOs, allowing for more preemptive credit decisions and offering investors the opportunity to benefit from a collateral manager’s expertise.

The analysis of cash-flow, multisector CDOs backed by ABS, CMBS, RMBS and other CDOs,⁶ requires consideration of a number of issues, including:

- Diversification
- Credit quality (likelihood of default and assumed recovery rates for the collateral)
- Cash-flow characteristics

In *Appendix I*, we identify the various asset classes that have so far been considered for multi-sector CDO collateral pools. We now turn to the modeling issues that must be confronted in rating multisector CDOs.

MEASURING DIVERSITY

Moody's *diversity score* makes it possible to mimic the loss distribution of the true collateral portfolio by representing the pool with a number of identical assets, each with independent default risk. The reduction of the actual portfolio to a synthetic pool of identical assets in this way facilitates the process of calculating the expected losses associated with each rated tranche. The diversity score is the number of such identical assets. Other things equal, the diversity score will be higher for pools in which the assets have lower default correlation, and in which the distribution of asset size is more uniform.

For traditional CDOs, a diversity score is computed by grouping the collateral assets by industry. For multisector CDOs, we apply a similar approach, in that the assets are grouped into several categories or sectors. In some cases, these ABS or MBS "industries" may be at least as independent of each other as are the corporate industries used in a traditional CDO. In others, there is reason to believe that certain sectors are linked by more than overall macroeconomic performance, so that some correlation should be assumed between them. Both inter- and intra-sector default correlation should affect the value of the diversity score.⁷ Other collateral characteristics, including rating, maturity and size, also play important roles in this alternative computation of the diversity score. Apart from diversification by asset type, we also look for diversification and limitations with respect to servicers and originators. Factors such as geographic or vintage concentration may also be important.

Allocating Structured Securities to Sectors

Similar to the diversification analysis of common CDOs, the first step is to classify the collateral pool according to asset type. *Appendix I* provides a list of some common structured security types, including: auto ABS, credit card ABS, equipment leasing ABS, home equity loan ABS, manufactured housing ABS, small business loan (SBL) ABS, student loan ABS and some more esoteric ABS types;⁸ CDOs; CMBS conduits, CMBS Credit Tenant Lease (CTL) and CMBS large loans; Residential A mortgages and residential B&C mortgages; REIT debt.

Besides the above more commonly known structured securities, we anticipate that new securitization products will continue to develop. Thus over time we will revise our asset classifications to accommodate market innovations.⁹

Application of the Alternative Diversity Score Methodology

Because the interpretation of an "industry" in a CBO of structured assets differs somewhat from that of a typical CDO, we have modified our diversity score calculation. The goal, however, remains the same—to determine the number of independent, identical assets that mimics the loss distribution of the actual collateral pool. The calculation of the "alternative" diversity calculation is presented in *Appendix II*.

⁶ See also "The Inclusion of Commercial Real Estate Assets in CDOs," Moody's *Special Report*, October 1999.

⁷ Of course, for Moody's traditional CDO analysis, bonds in different industry categories are linked via the performance of the overall economy, but that correlation is captured through the stressing of default rates, rather than the diversity score.

⁸ We also classify home equity lines of credit, sometime known as HELOC, in this category.

⁹ Some recent market innovations include the securitization of mutual fund fees, tax liens, structured settlements and future flows. Inclusion of these more esoteric asset types often entails Moody's review.

Diversity for Guaranteed Instruments

Some structured securities may benefit from a guarantee, or equivalent enhancement, from a third party. These enhancements may take the form of a financial guaranty insurance policy from monoline guarantors such as FSA, AMBAC and MBIA, guaranties by companies active in securitizations such as Conseco and Clayton Home, and letters of credit from banks.

Payment deficiencies in principal or interest or liquidation losses may be supported by a guarantee. The guarantor may be required to make deposits to an account, make advances, or purchase defaulted collateral. The scope, amount, and allocation of payments made under and pursuant to the guarantee will vary from transaction to transaction. The rating on the tranche supported by the guarantee will be contingent on the maintenance of the guarantor's credit rating.

A typical insurance policy offered by a monoline entitles security holders to receive timely payment of interest when due, and the payment of principal no later than the stated legal maturity. The wrap is typically unconditional. Thus should the structured instrument become distressed, its performance will be tied to the financial strength of the guarantor. To reflect this credit enhancement within our sector classification scheme, we include such wrapped assets within the industry represented by the guarantor—e.g., “insurance” in the case of a monoline, the appropriate corporate sector in the case of a corporate guarantee, and “banking” in the case of a bank letter of credit.¹⁰

For the purpose of calculating the diversity score for a pool of structured securities, multiple debt tranches from a single transaction will usually be consolidated as one security.¹¹ After consolidating a collateral pool in this way, the average rating, average maturity, and the total face value of consolidated securities is applied for the purpose of alternative diversity score calculation.

Assumptions about Default Correlations

In order to apply the alternative diversity score, we must make assumptions about default correlations. Implicitly, any measure of diversification relies on such assumptions. Because there have been very few defaults among structured instruments, our default assumptions are based on *a priori* views as to the extent to which different asset classes are related.

Default correlation is associated with the credit quality of the collateral, and we factor this assumption into our diversity score calculation. For example, the default correlation for investment-grade ABS is lower than the default correlation for below-investment-grade ABS. Thus the assumed correlation for a pool of ABS subordinated tranches would be higher and the diversity score lower than for a pool of senior ABS obligations.¹²

In addition to the impact of collateral rating levels on our correlation assumptions, we believe that the performance of certain types of structured securities are more tightly linked than others. For example, some of the most developed structured sectors are related in some way to consumer finance. These include credit card, auto, home equity loan, manufactured housing and student loan securities. Within this broad sector, which includes the bulk of ABS, we assume that auto and credit card ABS are more highly correlated with each other than with other ABS because they are closely related to consumer behavior. Home equity loan and manufactured housing deals are moderately correlated with credit card and auto ABS, but more correlated with each other. Student loan paper is modestly correlated with the other consumer-finance oriented ABS because most student loans are either fully or partially guaranteed by the government. All of these categories are assumed to be uncorrelated with less traditional ABS types such as mutual fund fee, tax lien and structured settlement securitizations.¹³ Residential A mortgage deals are more highly correlated with each other than with Residential B&C deals. Also, both Residential A mortgage and Residential B&C mortgage are moderately correlated with home equity loan and manufactured housing deals.

¹⁰ In truth, the default behavior of the instrument will share something with other structured assets of the same type, and something with other guaranteed obligations. For consistency with the rating of the instrument, which is normally that of the guarantor, we believe is more appropriate to associate the default characteristics of the asset with that of the guarantor.

¹¹ To the extent that the two tranches within the same transaction have very different ratings, we may depart from this practice. It is apparent that the default of a very junior tranche within a transaction does not assure that the senior-most tranche will default (though a senior-tranche default does indeed imply a junior-tranche default). The assumption of 100% default correlation is a simplifying assumption in cases where the rating gap is relatively narrow.

¹² In addition, default correlation should be a function of collateral maturity as well. Default correlation is generally smaller over short investment horizons, but it increases over time and then should decrease with time. For empirical evidence, see “Default Correlation and Credit Analysis” by D. J. Lucas, the Journal of Fixed Income, March 1995. For some analytical results, see “Default Correlation: An Analytical Result” by C.S. Zhou, Federal Reserve Board working paper, 1997.

¹³ Echoing footnote #7, we observe that though we may assume no correlation for certain pairs of ABS sectors, they are clearly linked by overall economic performance. However, as in a conventional high-yield CDO, that correlation is captured in our methodology through the stressing of default and recovery rates, rather than explicit correlation assumptions (with a direct link to the diversity score calculation).

For CDOs with both structured credits and corporate bonds included in the collateral pool, we believe a certain degree of default correlation may exist between structured credits and corporate bonds for certain sectors. For example, the performance of a CMBS CTL security may be linked to the default behavior of a retail firm and/or a corporate bond within the “building and real estate” industry; or, a franchise loan deal backed by loans to fast food restaurants may be linked to the behavior of a corporate bond within the “personal, food, and miscellaneous service” industry. One must lay out the default correlation assumptions for each pair of credits before applying Moody’s alternative diversification analysis.

In practice, our assumed default correlations range as high as 40%.¹⁴ The highest assumed correlations generally apply to pairs of noninvestment-grade assets with narrowly defined sectors. Assumed correlations for pairs of investment-grade credits would rarely surpass 15%. Apart from the consumer finance-related ABS, and linkages between mortgage-related ABS and RMBS, most of the structured instruments in different sectors are considered to be independent of each other.

We stress that for ABS and MBS, as for virtually all structured debt, this is more or less a theoretical view. In the absence of meaningful default data, it is impossible to develop empirical default correlation measures based on actual observations of defaults. Our default correlation assumptions instead reflect extensive discussions with Moody’s analysts who have expertise with the various types of ABS and MBS, as well as a considerable degree of common sense. For example, we have reasoned that at a given rating level, narrowly defined ABS categories, such as consumer finance sectors, should exhibit higher correlation than typical CDO industries. To the extent that additional data relating to the potential correlation in defaults for structured tranches becomes available, we will modify our assumptions.

Geographic, Servicer and Vintage Concentration

We believe that our correlation assumptions are reasonable, as well as somewhat conservative, provided that the collateral pool does not exhibit excessive geographic concentration. For example, on a collateral pool look-through basis, the assumptions would not be valid if the underlying assets within the ABS or MBS pool were all originated in a single state. As a guideline, we are comfortable applying our correlation assumptions where no more than 20% (by par amount) of the underlying credits backing the securities are originated in a single state, with exceptions for California, New York and Texas, where a somewhat higher ceiling would be acceptable. The exceptions recognize that a disproportionate volume of ABS and MBS is backed by assets from these large states, and that the economies of these states are relatively well diversified. Excessive geographic concentration would result in a modification of our correlation assumptions.

Similarly, we would expect the pool to be reasonably well diversified across servicers. Here the concern is a potential correlation in the performance of the assets associated with the performance of the servicer.¹⁵ In general, a badly performing or defunct servicer can be replaced, but there may be delays or a disruption of cashflows that could result in outright pool losses in connection with the transfer of servicing responsibility. Thus we would generally encourage diversification of servicers, with the possible exception of very highly rated entities for which the likelihood that a replacement will be required is remote.

For cases in which multiple securities generated by the same originator are included in one CDO, similarity in collateral type, geographic concentration, or underwriting standards may also give rise to default correlation. For example, seasoned issuers may execute a few deals of the same type each year. Deals issued in the same year, and backed by a particular collateral type, may well perform very similarly—the vintage effect. By contrast, deals issued in different years are less likely to perform similarly. Such vintage effects may reflect a particular set of underwriting standards, the common quality of the loans, or the competitive landscape at a particular point in time.

¹⁴ The highest figure applies to B-rated, low-diversity, cash-flow CDO tranches. CDO default correlations were inferred by simulating the default behavior of underlying CDO pools, making realistic assumptions about industry and asset overlap between transactions. Note that correlations may be even higher for pairs of market-value CDOs backed by similar assets.

¹⁵ Other factors that may affect deal performance include the practices of an originator, the standards of an underwriter, and the reputation of a seller.

Inclusion of deals done in different years serves to mitigate the vintage effect. If multiple tranches from the same transaction are included in a CDO, we will usually consolidate them into one bond, effectively assuming 100% default correlation between them. For investment-grade credits, if two bonds come from two different transactions of the same type and by a same issuer, we assume: extremely high correlation if the two issues are sold in the same year, very high correlation if they are sold between one and two years apart, and high correlation if they are sold more than two years apart. For below-investment-grade credits, the corresponding correlation assumptions would be even more severe.

When CDO tranches are included in a multisector pool, factors such as the mixtures in collateral managers and ramp-up period may come into play. Deals done by the same manager may share the same management style, such as the same credit preference, sector positioning and trading patterns. Arbitrage CDOs that are ramped up during the same time period may share a large number of the same names, and may be affected by the same market conditions, such as the relative price of the underlying collateral. Consequently, these factors may lead to correlated performance of CDOs. Moody's will adjust its default correlation assumptions to reflect these concerns.

Global Pools Can Boost Diversity

We have, to date, focused on pools of collateral generated within the U.S. But the pace of growth in structured finance is even more rapid in Europe and Asia than in the U.S. By purchasing structured instruments backed by assets in a variety of countries, it may well be possible to achieve even greater diversification. Indeed, this may be an attractive alternative to structuring conventional high-yield CDOs — particularly in view of the still immature markets for high-yield corporate debt in Europe and Asia.

In general, we believe that there is opportunity for significant independence between structured asset types across different countries. Diversity increases when looking at distinct asset types — e.g., CMBS in the U.K. vs. consumer loans in Germany — but even within a single asset class, diversification can be achieved by pooling assets from several different countries. Because economies outside the U.S. are generally not as well diversified as those within the U.S., it is reasonable to assume somewhat higher default correlation for a given pair of asset

types within any single European or Asian country.

A Study to Gauge Recovery Rates Leads to Conservative Assumptions

Because potential loss severity is an important factor in expected loss estimations, Moody's conducted an extensive study of a wide range of ABS, MBS and CDO transactions to ascertain the likely extent of losses in the event of default for each transaction type. We first sampled a large number of structured transactions over a variety of asset classes. We then identified the risk characteristics for typical structures within each asset class. These characteristics included Moody's rating assumptions about collateral cash-flow, excess spread, collateral loss distribution and so on. Next, we applied numerous cash-flow scenarios to structured transactions based on typical priority of payment schemes and liability structures. With this process, we were able to determine severity of loss for each tranche in those cases where losses might occur. Based on these scenarios, we developed somewhat conservative recovery rate assumptions for various tranches within several types of ABS, MBS and CDO structures, as set out in *Appendix III*.¹⁷

ASSESSING CREDIT QUALITY: DEFAULT AND RECOVERY RATES

Moody's ratings of other structured products, like its ratings of CDOs, require an analysis of the expected losses posed to investors in each rated tranche. These expected losses depend on both the likelihood of any loss for the tranche, as well as the probable extent of loss should there be a shortfall vis-à-vis the rated promise to pay coupons and return principal.¹⁶

Modeling cash-flows for the limited number of assets in a CDO pool requires judgments regarding both the likelihood of default for each collateral asset, as well as the ensuing recovery rate in the event of a default.

¹⁶ Within the ABS world, the expected loss is normally expressed as a basis-point reduction from the promised internal rate of return (IRR).

Nevertheless, regardless of whether expected loss is expressed as a percentage loss of present value or a reduction in IRR, the concept is the same — the probability-weighted average shortfall across possible scenarios with respect to a predetermined promise. Measures such as recovery rate and severity of loss have the same interpretation for ABS as, say, CDOs.

¹⁷ To clarify the meaning of "conservative" in this context: here, lower assumed recovery rates are generally more conservative, even given the expected loss of the ABS tranche. Intuitively, a lower recovery rate implies that each default in the pool has a greater consequence for the CDO of structured securities. The greater effect of this "lumpiness" is akin to a lower diversity score for the pool.

Unlike corporate bonds, defaults for structured securities have been rare, and the history of securitization is relatively short. Consequently, for structured products, reliable empirical evidence on default rates, rating migration history and recovery rates is not yet available. Nevertheless, we know that structured transactions are rated to achieve consistency between the ratings and corresponding expected loss benchmarks.

Our assumptions relating to the expected losses associated with structured tranches that serve as assets in multisector CDOs are therefore based on our ratings. Should additional information become available — i.e. through a meaningful number of actual defaults and recoveries on structured tranches — we will incorporate that information into our analysis.

In general, the assumed recovery rate will be higher the more highly rated the tranche, the larger the tranche (as a percentage of total liabilities in the structure), and the smoother the distribution of losses within the collateral pool (as, for example, in credit-card ABS, vs. emerging-market CDO transactions). *Appendix III* illustrates Moody's severity of loss assumptions.

For securities that are insured by financial guarantors or are guaranteed by corporations, losses will only occur if both the security is in default and the guarantor becomes insolvent. Where the guarantor is a corporation or a bank, we assume a corporate recovery. Where the guarantor is a monoline (and thus a shadow rating is available for the guaranteed tranche), we assume the recovery rate for the relevant instrument type.¹⁸

Once the recovery rate for a tranche has been determined, it is used in conjunction with the expected loss implied by the rating and the weighted average life of the tranche to calculate the assumed default rate. In this way, the default and recovery rate behavior of each collateral asset can be modeled along with the corresponding impact on the cashflows generated by the collateral pool.

It is important to note that our recovery rate assumptions depend on the *initial* capital structures of the transactions from which the instruments that comprise the resecuritization CDO's collateral pool are derived, as well as the initial ratings of these instruments. Both the capital structures and the ratings may change as amortization triggers are hit, or transactions amortize on schedule. Our study of recovery rates already anticipates that capital structures and, especially, ratings will change prior to defaults on the underlying collateral.

ASSESSING CASH-FLOW CHARACTERISTICS

In this section, we will focus on some cash-flow characteristics of multisector CDOs, including the principal amortization profile and its relationship to the weighted average coupon, prepayment sensitivity, the weighted average life, reinvestment risk, the likelihood of a deferral of interest and the inclusion of interest-only strips (IOs).

Amortization Profile and Weighted Average Coupon (WAC)¹⁹

In contrast to typical corporate bonds, most ABS and MBS tranches are amortizing, rather than bullet instruments. Hence, the outstanding balances of most ABS and MBS tranches decrease over time.

One key element in structuring a multisector CDO is the WAC of a collateral pool. However, simply relying on the initial WAC as a modeling input is not sufficient. For example, in a static-pool, multisector CDO, if high-coupon assets amortize faster than low-coupon assets, the WAC of collateral will fall over the life of the transaction. Or, if high-coupon assets are more prepayment sensitive, in a declining interest rate environment, they may prepay faster than low-coupon assets. Consequently, the WAC of the collateral pool may decline as rates fall. In either case, the risk is that the interest cash-flow generated by the collateral pool will be insufficient to pay the interest on the CDO liabilities.

¹⁸ We adopt this conservative approach because it is not clear how the noteholders will recover from the estate of the guarantor if the guarantor becomes insolvent before the structured instrument defaults. For example, it is not clear how a state insurance regulator would set aside resources for future contingent claims if, say, a monoline insurer failed. If one could be confident that such resources could be appropriately scaled and set aside, the recovery rate for the guaranteed instrument would then be $R_s + R_g * (1 - R_s)$, where R_s is the recovery rate for the security, and R_g is the (corporate) recovery rate for the guarantor.

¹⁹ For pools with both fixed-rate assets and floating-rate assets, the weighted average spread (WAS) should be examined in conjunction with the WAC.

For the purpose of applying Moody's CDO model,²⁰ we must determine a WAC commensurate with the WAC of the collateral pool. Given the pool, assuming no defaults and the base-case prepayment speed (described below), the base-case cash flow is generated for each credit in the pool. Ultimately, using the current pool,²¹ the weighted average cash-flow characteristics can be established for each period throughout the life of the transaction.

Once the principal amortization and WAC schedules have been identified for the initial pool, Moody's may assume conservatively, for example, the smallest WAC across time for the purpose of modeling CDO cash flows. On the other hand, the reinvestment flexibility that is common to most revolving CDOs may help the collateral manager to maintain the projected WAC around its target level. Once the manager has identified a target WAC that is consistent with the initial portfolio, Moody's will model the cash flows according to the target WAC, which will also be reflected in the indenture.

Prepayment Sensitivity

Clearly, collateral cash flows are affected by both defaults and prepayments. Various collateral default scenarios are built into Moody's analytic approach, wherein reductions of cash flow due to defaults are taken incrementally, one "diversity bond" at a time.²²

Prepayment speeds for structured securities depend on a variety of collateral and structural features.²³ For example, the prepayment speed of the underlying collateral pool, as well as the timing of recoveries following charge-offs, will affect the prepayment behavior of a structured security. Structural features such as the allocation scheme for prepayment proceeds will also affect the prepayment behavior of the structured security.

Collateral prepayment characteristics differ from one asset type to another. For our purposes, it is useful to distinguish between structured products backed by amortizing assets, and those backed by nonamortizing assets.

- *Amortizing assets*, such as fixed-rate mortgages, fixed-rate home equity loans (HEL)²⁴ and auto loans, have scheduled interest and principal payments. If the borrower pays more than the scheduled payment, the extra payment is effectively a prepayment.

For residential mortgages, the borrower implicitly pays the lender a higher rate of interest for the right to prepay at any time. By contrast, for almost all commercial mortgages, the borrower is either prohibited from prepaying or faces significant financial disincentives to prepayment. Prepayment protection comes in various forms, with a "lock-out," or complete prohibition against prepayment, being the strongest.²⁵ In our analysis, we assume commercial mortgage loans do not prepay when the lock-out is still effective.

²⁰ See "The Binomial Expansion Method Applied to CBO/CLO Analysis", Moody's *Special Report*, December 1996.

²¹ The cash flow of a structured security may depend on several factors, including the characteristics of the underlying assets, the capital structure, interest coverage or principal coverage triggers, reserve account and/or excess spread mechanisms, and other priority of payment features. Often, the cash flows for public ABS and MBS are available via software vendors such as Trepps, Intex and Conquest. For private issues, the coverage of the software vendors may be less comprehensive. Under these circumstances, we will generally rely on the underwriter's runs with confirmation from third-party auditors.

²² Thus if the diversity score is, for example, 20, then each default within Moody's binomial model will result in the loss of 5% of cash flows (before any recovery).

²³ Due to the range of asset types within the structured finance marketplace, a variety of measures of prepayment speed exist. Common scales include the single month mortality rate, constant prepayment rate, Public Securities Association rate, absolute prepayment speed, home equity prepayment rate, manufactured housing prepayment rate and prospectus prepayment rate.

²⁴ Home equity loans can take two forms. The closed-end version, where the loan amount and term to maturity are known at origination and the loan is primarily fixed rate, is more often called HEL. The open-end alternative, where the borrower receives a home equity line of credit that can be drawn down and paid back over time and often carries a floating interest rate, is generally referred to as a HELOC. For Moody's diversification purpose, they are classified in one category.

²⁵ For the purpose of prepayment stress runs for CDOs, we assume commercial mortgages prepay immediately in whole once any lock-out provision expires. Another aspect of commercial mortgage loans is the balloon loan extension. We assume an extension of three years for balloon loans for the purpose of CDO stress testing.

- *Non-amortizing assets*, such as credit card receivables and home equity lines of credit (HELOC), do not have a fixed payment schedule. The borrower has to pay a minimum amount. Thus, there is usually no concept of “prepayment” for non-amortizing assets because there is no predetermined amortization schedule.

The timing of cash flows from credit card ABS may be affected by many factors, including payment and utilization rates for the underlying, and other structural features. To simplify the CDO analysis, we use the expected life and cash flows based on average payment and draw rates for credit card or HELOC collateral as the base case. We will use the legal final maturity of the tranche for the purpose of stress testing.²⁶

With the exception of some bank-balance-sheet CLOs, CDO notes generally have no scheduled principal payments prior to the legal final maturity. Principal payments may occur unexpectedly following a failure to meet an overcollateralization test, but such payments would not be received in transactions that perform well. Deals that are performing well, however, may be called after the noncall period expires. For CDOs with a revolving period, prepayment risk from the underlying bonds is mitigated because prepayment proceeds and collateral recoveries are reinvested in eligible collateral during the revolving period.

To simplify the analysis: for arbitrage CDOs, we will use the zero-default cash flows and the corresponding expected weighted average life (WAL) as the base case; for master trust balance-sheet CLOs, we will use the zero-default cash flows assuming average bank loan payment and draw rates, and the corresponding expected WAL as the base case.²⁷

Stressing Prepayment Sensitivity

Because the extension or compression of collateral cash flows may directly affect default likelihood, credit enhancement and excess spread for a CDO, it is important to examine the stability of a CDO rating under different prepayment scenarios. Prepayments can be a result of turnover, refinancings, defaults and partial paydowns. If a CDO includes amortizing assets, sensitivity analysis is required to ensure that the ratings are robust across a range of prepayment scenarios. To determine the base-case speed for seasoned deals, we use the actual average prepayment speed of the past six payment periods as an estimate. For newly issued tranches, we use the speed assumed to price the transaction. In the slower-speed case, we typically reduce the base-case prepayment speed by 50%. In the rapid-prepayment case, we typically double the base-case speed.

This practice of stressing the WAL and cash flow by halving or doubling prepayment speed is intended to capture in our ratings some relatively extreme prepayment scenarios. Because the prepayment behavior differs from one asset type to another, other stresses may be appropriate for some collateral pools. For some asset types, such as, Residential A mortgages, prepayment speed tends to be quite sensitive to interest rate changes. In contrast, subprime mortgages may have more stable prepayment rates because subprime borrowers generally have fewer prepayment options and often find it more costly to refinance. For auto or student loan ABS, prepayments have little to do with interest rate changes and are generally stable. As a rule, we will want to apply a wide range of prepayment speeds to sectors with more volatile prepayment characteristics, but may only apply a narrow range of prepayment scenarios to sectors with more stable prepayment patterns.

In general, provided a straight sequential waterfall, senior classes are more sensitive to collateral prepayment than junior classes because prepayments are allocated first to senior classes. Thus, junior tranches are less prone to prepayment risk but more prone to extension risk than senior tranches. Since it is typically the junior tranches that are resecured via CDOs, we believe that halving and doubling prepayment speeds is sufficiently stressful, provided that a CDO neither has a huge exposure to highly prepayment-sensitive securities (such as the senior classes of Residential A mortgage securities) nor is heavily invested in extension-prone securities (such as deeply subordinated Residential A mortgage securities).

²⁶ For stress testing purpose, notice that assuming zero payment rate may not lead to lengthening in WAL. This is because of a common structural feature present in those deals whereby early amortization is likely to be triggered under the circumstance of extremely low prepayment rate. Thus, the WAL may in fact be shortened.

²⁷ For multisector pools with a large bucket in CDOs, this may be refined.

Weighted Average Life (WAL)

The WAL of the CDO collateral pool is an important modeling input because it partially determines the default probability assigned to the assets.

In high-yield, leverage-loan or emerging-market CDOs, the weighted average maturity (WAM) profile is often used for the purpose of the collateral quality tests. Because collateral assets are generally structured with bullet principal payments, the WAM is a good proxy for the WAL. In CDOs of structured instruments, however, most of the assets are amortizing. For this reason, a WAL test, rather than a WAM test, is necessary. In practice, the WAL will be based on actual prepayment speed and current underlying default experience. Any prepayment risk or extension risk should be reflected by varying the WAL in different scenarios.

Reinvestment Risk

An environment in which prepayments are particularly high is typically not the best for reinvestment. For example, Residential A securities may end up prepaying when interest rates are low. At such times, it may be difficult to reinvest prepayment proceeds into new Residential A securities without eroding the WAC of the pool. In practice, the proceeds may be reinvested in other sectors with good relative values as long as portfolio WAC is maintained or improved.

Within a multisector CDO, diversification across various asset classes helps to mitigate reinvestment risk. For example, CMBS prepayments may not be driven by the same factors as Residential A security prepayments. Because of the hefty prepayment penalties that are common in CMBS structures, fixed-rated commercial mortgage borrowers may prepay only if the improvement in commercial property value is large enough to offset any prepayment penalty that may be incurred.

A further means of mitigating prepayment risk is the treatment of any prepayment premiums as principal, rather than as interest proceeds. Thus during the revolving period, such proceeds would be used to purchase more eligible collateral; after the revolving period, the proceeds would be used to pay down CDO liabilities.

Risk of Deferral in Interest

Disruption of cash flows in structured securities may take several forms. Deferral in scheduled interest or scheduled principal, and pay-in-kind (PIK) notes are two examples of such disruptions.

Clearly, if a rating addresses the promise of timely payment of interest and principal, as is typically true for senior tranches in structured transactions, the risk of disruption of cash flows is reflected in the rating. In other words, a default will result if those classes do not receive interest payments on time. For many junior tranches, however, Moody's ratings may not address the promise of timely payment of interest and principal.²⁸ In these cases, the risk of disruption of cash flows must therefore be separately analyzed.

In CDOs backed primarily by structured securities, cash-flow disruption risk may be mitigated by features such as write-down provisions, servicer advancing, reserve accounts, liquidity swaps and the priority of payments within the CDO.

Write-down provisions, through which the principal balance of an ABS instrument is reduced (or written down) to reflect losses in the collateral backing the ABS instrument, ensure current measures of interest due on, and the principal balances of, structured securities. The CDO's interest-coverage and par-value tests will be adjusted for any written-down amount²⁹ so that they can properly reflect the status of the underlying collateral.

²⁸ For example, we will not assign a rating of A2 or better to a CDO tranche that is PIKable. We also seek to avoid dramatic discrepancies between the rating suggested by expected loss, and the likelihood of a payment interruption.

²⁹ In mortgage deals, appraisal reduction amounts may be used as a preemptive signal for write-downs.

For assets that do not have explicit write-down provisions, it may be appropriate to incorporate the concept of a “loss event.” If the outstanding collateral balance, after adjustment for defaults — and giving effect to any excess spread and available reserves — is smaller than the sum of the outstanding balances of the security and any other senior or *pari-passu* liabilities, a loss event has occurred with respect to the security. Under such circumstances, the multisector CDO’s interest-coverage and par-value tests should be adjusted to reflect the loss amount. For assets that allow for PIKing, similar loss measurements should be applied. In addition, if the tranche has been PIKing for more than a short period of time—say, six months or one-year—it should generally be written down to the lesser of the tranche’s market value and its assumed recovery amount. Alternatively, a rating-based definition of a loss event could be incorporated.

Servicer advancing helps to provide continuity in cash flows. Servicers will often step in to advance funds to the transaction if the servicers believe that the advances are likely to be repaid. Also, some deals have reserve accounts or third-party guarantees that may offer additional protection against an interest shortfall.

Two widely used mechanisms to ensure that interest continues to be paid on the multisector CDO’s liabilities are reserves and liquidity swaps. Cash reserves may be funded at the outset, or through the trapping of excess interest over time. Liquidity swaps ensure that interest will continue to be paid on the liabilities (at least with a likelihood given by the swap provider’s rating), even if there is a temporary interruption of the cash flow generated by the pool’s assets.

Finally, for structures in which interest is paid to all of the rated tranches before principal is allocated to pay the tranches, the ability to tap into the principal waterfall for interest coverage offers strong protection against an interest shortfall. By contrast, transactions in which interest is paid to the senior class, followed by principal to that class, and similarly down the capital structure, there is an increased likelihood of a cash-flow disruption for the all but the senior tranche — particularly when the senior notes are subject to a sinking fund schedule.

Inclusion of Interest-Only Securities (IOs)

Most of the multisector CDOs that we have seen to date are collateralized by investment-grade credits. Compared to a typical high-yield or emerging-market deal, the multisector deals therefore offer less excess spread between the coupons paid on the assets and those paid on the liabilities. To enhance the interest coverage for multisector deals, collateral managers may include a limited basket of IOs in the collateral pools.

One of the most important considerations when including IOs in cash-flow CDOs is the stability of the IO cash flows. The impact of prepayment risk, default risk and the allocation mechanism for IO cash flows are of particular importance.

Most ABS and MBS do not have the reinvestment feature that is common in CDOs; hence prepayment proceeds of the underlying assets are passed through to security holders directly. Prepayments accelerate ABS and MBS securities, and often lead to reductions in the outstanding notional balances of issued securities. Because an IO often represents a strip of interest collections based on the current notional balance, this may lead to severe reduction in IO cash flows.

As noted earlier, commercial mortgage deals typically offer greater cash-flow stability than residential mortgage transactions because of the prepayment protection provisions present in most CMBS deals. In addition to lock-out features—complete prohibitions against prepayment — yield maintenance provisions may also be in place. Such provisions permit prepayments, but require the borrower to make an additional payment sufficient to maintain the investors’ yield.

To date, fixed-rate CMBS IOs and franchise loan IOs have been included in multisector cash-flow CDOs. The main reason is that fixed-rate CMBS and franchise deals have strong prepayment protections, while floating rate CMBS and most RMBS deals have weaker protections. Because it is generally difficult to predict IO prepayments, the exposure of CDOs to such IOs is generally limited to 5% of the pool, based on purchase proceeds. Furthermore, we assume commercial mortgage and franchise loans prepay in full as soon as their prepayment protections expire.

We do not generally reflect the presence of IOs in calculations of the diversity score or the weighted average rating factor (WARF) in multisector CDOs. Because the ratings of IOs often only address the priority of payments, rather than the likelihood of the IO receiving timely payment of promised cash flows, it is inappropriate to include the ratings of IOs in the WARF calculation. Furthermore, since the IO is not associated with any payment of principal and the present value of IO cash flows is small in comparison to those of conventional instruments, we simply assume that IO has no contribution to CDO collateral par, and thus no contribution to the diversity score.

For the purpose of determining the portion of cash flows from an IO that should be included in multisector CDO cash-flow projections, the notional balance of the IO in the collateral pool is given a "haircut." The haircut is intended to include only the portion of the IO that represents claims on cash flows from tranches with ratings at least as high as the average rating of the multisector CDO's collateral pool.

We apply such haircuts to make sure that in the cash-flow modeling of the transaction, in which the WARF plays a key role, the IO's credit quality will be no worse than the WARF of the collateral pool. That is, although most IOs are rated **Aaa**, their credit risk may be linked to the most subordinated certificate from which the particular IO strip is derived. As an example, if the WARF of the pool were consistent with a rating of **Baa2**, and if the IO strip represented a claim on cash flows from tranches in a CMBS deal with ratings of **Aaa**, **Aa2**, **A2**, **Baa2** and **Ba2**, the IO notional should exclude the **Ba2** portion.

CONCLUSION

Resecuritization transactions now account for about 20% of the flow of new CDOs. In order to achieve sufficient diversity for pools of structured assets, most of these transactions take the form of multisector CDOs. Though multisector transactions raise analytical issues with respect to the calculation of diversity score, default and recovery rate assumptions, and cash-flow characteristics, we can express meaningful credit opinions about these CDOs by modifying our existing analytical approach. Going forward, we anticipate that the flow of multisector CDOs will not only continue, but that the transactions will be structured to accommodate an even wider range of collateral.

APPENDIX I

Classification of Structured Securities

Asset-Backed Securities

Consumer finance-related instruments:

Auto (loan or lease)

Credit Card

Student Loan

Home Equity Loans/Lines of Credit

Manufactured Housing

Aircraft/Equipment Leasing

Entertainment Royalties

Small Business Loans

Tax Liens

Mutual Fund Fees

Structured Settlements

Floor Plan

Utility Stranded Cost

Health Care

Rental Car

Commercial Mortgage-Backed Securities

Conduit

Large Loan

Credit Tenant Lease

Residential Mortgage-Backed Securities

Residential A

Residential B&C

REIT Debt

Hotel

Multifamily

Office

Retail

Industrial

Healthcare

Self Storage

Diversified

Collateralized Debt Obligations

Domestic Corporate

Emerging Market

Special Considerations for Certain Asset Classifies

The intuition behind our choices of sector groupings for structured instruments should generally be clear, but the classification of a few instruments requires further comment.

RMBS

As indicated above, we have divided Residential MBS (RMBS) into Residential A and Residential B&C subsectors. RMBS transactions are often designated as “Jumbo-A,” “Alt-A” (alternative-A) or “High LTV” (loan-to-value) as well. Jumbo-A loans, also known as Residential A mortgage loans, have similar credit quality to agency mortgages, but the loans within the pool tend to be larger. High LTV pools, provided that they contain virtually all first-lien loans, should normally be grouped in the B&C (or subprime) mortgage bucket. Alt-A loans, in contrast to subprime loans, are made to borrowers with good credit records, comparable to “A-” quality loans, but the borrowers may have some trouble documenting their incomes. For the purpose of CDO diversification analysis, we place Alt-A transactions in the Residential A bucket.

Though Home Equity Loan and Manufactured Housing transactions are classified within the broad ABS sector, we explicitly assume some correlation between these classes and RMBS instruments.

SBL ABS and CDOs

We have placed Small Business Loan (SBL) ABS and CDOs in different buckets, although both transaction types are backed by corporate obligations. The small businesses in SBL obligor pools are typically very small, unrated entities, such as gas stations, food stores, automobile dealerships or small hotels. They tend to focus more on the local markets in which they reside, and the performance of the SBL pools is often tied to the health of local economy. By contrast, the obligors in most CDO pools are large, nationally or internationally oriented firms.

SBL ABS may also resemble CMBS because the pools are secured by first liens on commercial real estate. The distinction, however, is that the real estate behind an SBL is used as an integral part of the business being financed. For example, a default by the owner of a small food store or gas station financed by an SBL is not likely to be related to how strong the rental market is for shopping centers or convenience stores. Unlike the loans within a CMBS pool, however, the SBL does not rely on the rental of the property to produce cash flow. Rather, the small business is the key for supporting the loan. The real estate is the asset of last resort if the business fails.

Segmentation by Rating, Country

Though not explicitly indicated in the above classification scheme, we also divide each security type into two subclasses when assigning default correlations: investment-grade and noninvestment-grade securities. Because of the very low diversity associated with CDOs of CDOs and the consequent need for finer distinctions, we have further refined the classes into letter-rating buckets; e.g., “B” CDO tranches, “Ba” CDO tranches, etc.

Also, additional sectors may be appropriate where the portfolio is internationally diversified. The extent to which this is true will depend, in part, on the extent to which the default behavior of an asset backing the multisector CDO are is determined by global, rather than local economic factors. For example, consumer finance-related ABS in the U.S. is likely to be driven by factors distinct from those affecting, say, French consumer finance-related ABS. However, aircraft leasing transactions in the two countries may be affected by the same factors, suggesting some default linkage.

Correlation with Corporate Industries

Though most multisector transactions focus exclusively on structured instruments, some have begun to incorporate substantial buckets for conventional high-yield bonds. We consider many of the structured finance sectors listed above to be correlated with certain corporate industries. For example, aircraft-leasing transactions would be correlated with obligations from firms in the Aerospace and Defense industry.

APPENDIX II

Alternative Diversity Score Methodology

To derive the diversity score for a pool of collateral assets with correlated default risk, Moody's has developed an alternative diversity score method.

The alternative diversity score methodology provides a general framework for analyzing CDO collateral diversification. Provided that one can reasonably assess the default correlation between assets and the other portfolio summary characteristics described earlier, the alternative diversity score method can then be adapted in a straightforward manner.

The derivation of the alternative diversity score is based on matching the mean and the standard deviation of the return distribution associated with the actual collateral pool.³⁰ The final result can be presented in the following format:

$$(1) \quad \text{Diversity Score:} \quad D = \frac{(\sum_{i=1}^n p_i F_i)(\sum_{i=1}^n q_i F_i)}{\sum \sum \rho_{ij} \sqrt{p_i q_i p_j q_j} F_i F_j}$$

Here, the actual collateral pool consists of n bonds; bond i has a face value F_i and a default probability p_i that is implied by the rating and maturity of the bond; the probability of survival for bond i is $q_i = 1 - p_i$. We also denote the correlation coefficient of default between bond i and bond j as ρ_{ij} . Consequently, the actual collateral pool can be replicated by D identical securities with independent default risk in which the face value of each diversity bond is merely the average face value of the pool (F)

$$F = (\sum_{i=1}^n F_i) / D$$

and each bond has the average default probability

$$p = \frac{\sum_{i=1}^n p_i F_i}{\sum_{i=1}^n F_i}$$

If all assets have the same rating, then the alternative diversity score in equation (1) can be simplified as

$$(2) \quad D = \frac{(\sum_{i=1}^n F_i)^2}{\sum \sum \rho_{ij} F_i F_j}$$

In addition, if the notional balance of each asset is equal, equation (2) can be simplified further to

$$(3) \quad D = \frac{n^2}{\sum \sum \rho_{ij}}$$

If all default correlations are the same, i.e., $\rho_{ij} = \rho$, then equation (3) can be reduced to

$$(4) \quad D = \frac{n}{1 + (n - 1) \rho}$$

Thus to calculate the alternative diversity score, one must specify some portfolio characteristics, including the rating profile, the maturity profile, the face amount of each asset, and the default correlation assumptions.

³⁰ A detailed explanation of Moody's alternative Diversity Score method can be found in [Credit Derivatives](#), Risk Books (1999), pp.112-113.

APPENDIX III

Moody's Recovery Rate Assumptions

For the purpose of defining Moody's recovery rate assumptions, we categorize multisector securities in four distinct sectors:

Diversified Securities primarily include (1) Automobile Security; (2) Car Rental Receivable Security; (3) Credit Card Security; (4) Student Loan Security.

Residential Securities primarily include (1) Home Equity Loan Security; (2) Manufactured Housing Security; (3) Residential A Mortgage Security; (4) Residential B/C Mortgage Security.

Undiversified Securities primarily include (1) CMBS Conduit; (2) CMBS CTL; (3) CMBS Large Loan; (4) Those ABS sectors not included in Diversified Securities.

CDOs include (1) High-diversity CDOs (diversity score in excess of 20); (2) Low-Diversity CDOs (diversity score of 20 or less).

For Diversified Securities, the recovery rate is assumed as follows:

Tranche as % of capital structure	Rating of a Tranche					
	Aaa	Aa	A	Baa	Ba	B
>70%	85%	80%	70%	60%	50%	40%
[70%, 10%)	75%	70%	60%	50%	40%	30%
<=10%	70%	65%	55%	45%	35%	25%

For Residential Securities, the recovery rate is assumed as follows:

Tranche as % of capital structure	Rating of a Tranche					
	Aaa	Aa	A	Baa	Ba	B
>70%	85%	80%	65%	55%	45%	30%
[70%, 10%)	75%	70%	55%	45%	35%	25%
[10%, 5%)	65%	55%	45%	40%	30%	20%
[5%, 2%)	55%	45%	40%	35%	25%	15%
<=2%	45%	35%	30%	25%	15%	10%

For Undiversified Securities, the recovery rate is assumed as follows:

Tranche as % of capital structure	Rating of a Tranche					
	Aaa	Aa	A	Baa	Ba	B
>70%	85%	80%	65%	55%	45%	30%
[70%, 10%)	75%	70%	55%	45%	35%	25%
[10%, 5%)	65%	55%	45%	35%	25%	15%
[5%, 2%)	55%	45%	35%	30%	20%	10%
<=2%	45%	35%	25%	20%	10%	5%

For Low-Diversity CDOs, the recovery rate is assumed as follows:

Tranche as % of capital structure	Rating of a Tranche					
	Aaa	Aa	A	Baa	Ba	B
>70%	80%	75%	60%	50%	45%	30%
[70%, 10%)	70%	60%	55%	45%	35%	25%
[10%, 5%)	60%	50%	45%	35%	25%	15%
[5%, 2%)	50%	40%	35%	30%	20%	10%
<=2%	30%	25%	20%	15%	7%	4%

For High-Diversity CDOs, the recovery rate is assumed as follows:

Tranche as % of capital structure	Rating of a Tranche					
	Aaa	Aa	A	Baa	Ba	B
>70%	85%	80%	65%	55%	45%	30%
[70%, 10%)	75%	70%	60%	50%	40%	25%
[10%, 5%)	65%	55%	50%	40%	30%	20%
[5%, 2%)	55%	45%	40%	35%	25%	10%
<=2%	45%	35%	30%	25%	10%	5%

We recognize the limitation of relying simply on deal type and bond size as the key indicators for determining the recovery rate assumption. As more data become available, we will update our assumption accordingly. The impact of a particular recovery assumption is mitigated by the fact that expected loss for the asset is preserved. Moreover, for the purpose of determining whether overcollateralization tests are met in the multisector CDO, the par value attributed to a defaulted asset will be haircut to the lesser of assumed recovery rate and market value of defaulted security, as in typical high-yield CDOs.

APPENDIX IV

To facilitate the rating process, we will generally start with a review of the following information on underlying collateral:

1. *Transaction Structure*: We will look at a summary of transaction structure, including rating, sizing, seasoning, originator, servicer, geographical concentration).
2. *Credit enhancement*: What forms does the deal take (subordination, reserve mechanism and any guaranty)?
3. *Servicer's role*: Does it advance interest and principal? Who are the servicer, backup servicer and master servicer?
4. *Definition of event of default*: Does the rating address the timely payment of interest and principal?
5. *Write-down provisions*: Does the deal have a write-down provision and if so, how does it work?
6. *Summary of payment priority or waterfall*.
7. *Cash Flows*: How are base-case cash flows derived? What are the early redemption provisions? What is the base-case prepayment speed? Is the bond callable?
8. *IO's structural features and prepayment provisions*.

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