



Dominion

Bond

Rating

Service

Fundamentals of Leveraged Super Senior CDOs



JUNE 2005

MARK ADAMS

MANROOP JHOOTY

JIREH WONG

Leveraged Super Senior CDOs

EXECUTIVE SUMMARY

In recent years, asset spread compression has had important consequences for the CDO marketplace. Spread compression reduced the available arbitrage to the investment banks and also reduced the size of the credit risk premium payable to investors for the purchase of CDO tranches. In response to spread compression, investment banks took a variety of steps, including: (1) the creation of CDO squared structures; (2) longer dated transactions; (3) constant maturity swaps; and (4) the inclusion of alternative, higher yielding assets in CDO structures. These innovations were taken to restore spread availability.

While spread availability may have been restored with these innovations, the risk of CDO structures generally changed. In the case of CDO squared products, there was greater leverage and potentially greater risk. With inner CDOs feeding into a master CDO, there were a variety of design features that could be used to create a unique loss distribution for the particular CDO. Unfortunately, the fact that different CDO squared products created different loss profiles, and some had greater volatility and risk, was not necessarily fully appreciated by investors. In the case of alternative assets, and while spread was provided, performance parameters were not necessarily well documented or understood. As a general matter, the market response to spread compression was to pass on increased risk to investors.

Recently, this trend has changed due to structural innovations in the CDO market. In particular, DBRS has worked on a large number of the early leveraged super senior (LSS) CDOs that have been sold globally. These transactions are particularly significant and attractive for investors looking for large-scale exposure to remote and stable risk profiles, as LSS transactions offer the ability for investors to earn a leveraged return on what is ostensibly a remote credit risk. What is particularly interesting about LSS transactions is that, although they feature leverage, the leverage is located outside the structure, as opposed to being an integral feature of the structure (such as in CDO squared transactions). The location of leverage outside the structure makes a tremendous difference in the behaviour of the transaction. Unlike previous CDO developments, the presence of leverage in LSS transactions does not increase the credit risk of the transaction. Instead, risk is transformed from credit risk to funding risk, depending on the collateralization mechanism in the transaction.

This study comments on the general features of LSS transactions, the call mechanisms for LSS transactions, the evaluation and structuring of collateral calls for LSS transactions, and the applications of LSS technology in the CDO marketplace.

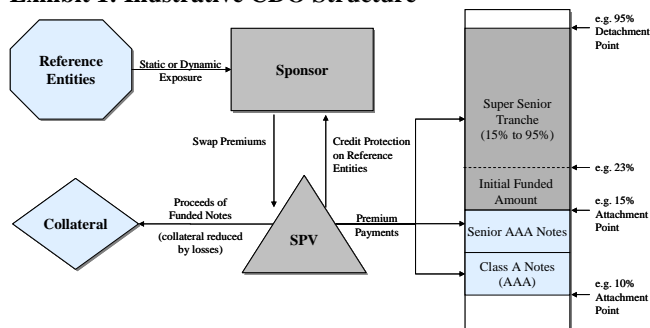
BASIC FEATURES OF AN LSS TRANSACTION

An LSS transaction can be described as a partially funded super senior tranche of a CDO. While it is a matter of opinion where a super senior tranche may attach, and while it is certainly a function of the individual CDO transaction, DBRS would generally consider the super senior position to attach at least 5% above the AAA attachment point. The detachment point of an LSS can be set at 100% or it can be something less. To give a practical example, and if a CDO had a 10% attachment point for AAA, an LSS may comprise the 15% to 100% tranche of the CDO.

Super senior tranches have been part of the CDO marketplace for considerable time. In earlier years, unfunded super senior CDO tranches did not attract regulatory capital given their remote risk profile, provided they were sold to an OECD bank.

While a super senior tranche is a remote credit risk, the credit premium for a super senior is commensurate with its risk. As a result, the credit risk premium varied between four basis points (bps) and 15 bps, depending on market conditions and depending on where the attachment point for a particular super senior was set. Having said this, and at least for OECD banks, there was no regulatory penalty for the originating bank if the investor bank did not collateralize its position. This obviously benefited both institutions since it effectively leveraged the super senior position. It is important to note that, in general, the credit risk premium on the super senior tranche does exhibit skew (i.e. analogous to the options market), as the risk free value is likely well below its traded value.

Exhibit 1: Illustrative CDO Structure



Moving out of the world in which a large, international bank is the investor that purchases the super senior, an issue facing the counterparty or the originating bank is the collateralization of the super senior tranche. The concern here is that, if collateralization does not occur, the originating bank is taking gap risk on its balance sheet and could potentially run into regulatory capital issues concerning the regulatory capital treatment of the super senior. At the same time, and if the super senior was fully collateralized, the purchase of a super senior would be an uneconomic investment.

The response to this issue has been the use of leverage. Using leverage helps to balance the bank's gap risk and the investor's return requirements. As an example, if a super senior pays ten bps, and following from the earlier example, if an investor has the 15% to 95% tranche, the investor may collateralize an amount from 15% to 23.0%. This would amount to ten times leverage and hence the investor would be effectively receiving 100 bps on the funded portion. The investor's real exposure as the credit protection seller, however, would be to the 15% to 95% tranche.

Exhibit 2: Numerical Example

Portfolio Notional	\$125,000,000
Super Senior Tranch	15% to 95%
Super Senior Notional	\$100,000,000
Amount Initially Funded (Leverage)	\$10,000,000 (10.0 x)
Spread on Super Senior	\$100,000
Implied Return on Funded Portion	100 bps

UNDERSTANDING MARK-TO-MARKET VALUATION

Evaluating LSS transactions is essentially no different from the analysis of an ordinary CDO. The credit analysis follows DBRS's traditional analysis. DBRS will generally run a Monte Carlo simulation to arrive at a distribution of potential loss outcomes, based on DBRS default curve, correlation, and recovery assumptions. The attachment point is set such that the probability of a first dollar loss is equal to or less than the AAA probability of default. Often, however, the credit analysis is extremely robust and does not constitute the issue of major concern in an LSS transaction.

As stated above, the key to understanding the LSS type of transaction is that, while the credit risk remains super senior in character, and leverage does not change the credit risk profile, a decrease in leverage will reduce the return earned by investors since this return is a function of leverage. In other words, and following from the example above, if, at the outset of the transaction, the investor has funded 10% of the tranche notional (i.e. 15% to 23%), and if the counterparty asks the investor to fund a larger amount of the 15% to 95% tranche, the investor's return will be reduced (refer to Exhibit 3).

Exhibit 3: Numerical Example

	10% Initial Funding	20% Initial Funding
Tranche Notional	\$100,000,000	\$100,000,000
Funded Amount (leverage)	\$10,000,000 (10.0x)	\$20,000,000 (5.0x)
Spread on Tranche (\$)	10 bps (\$100,000)	10 bps (\$100,000)
Implied Return on Funded Amount	100 bps	50 bps

The fact that an investor may be asked to increase collateralization in an LSS transaction also creates an additional risk beyond decreased spread: the requirement for increased collateral creates a funding risk. Before discussing this funding risk, however, it is important to understand why, and in what circumstances, the bank may ask the investor to fund progressively larger amounts of the super senior tranche.

Factors Impacting a Collateral Call

Generally the probability of a call is a function of the following variables: (1) the bank risk model; (2) the tolerance the bank has for gap risk; (3) the amount of leverage in the trade; and (4) funding mechanics. Each of these variables interacts with the others and cannot be separated out in the analysis.

The starting point of the analysis is the bank risk model. The bank risk model generates the mark-to-market (MTM) valuation of the super senior tranche. Generally, and in most models, MTM valuation is a function of: (1) spread movements in the portfolio; (2) cumulative losses in the transaction; and (3) the passage of time. Understandably, spread movements for reference obligations in the

transaction and cumulative losses in the transaction provide a picture of the overall credit health of the super senior tranche. Having said this, however, the impact of spread movements and cumulative losses on the super senior tranche will depend on where the super senior tranche attaches. The higher the attachment point, the less impact on the super senior MTM. Time also plays a very important role in MTM valuation. Particularly with synthetic transactions, the passage of time, or time decay, improves the credit strength and MTM resiliency of a super senior tranche.

In addition to the bank risk model, another issue is the bank's willingness to tolerate gap risk. If the MTM decreases, an LSS transaction is generally structured such that there can be a certain negative MTM valuation before a collateral call occurs. The extent of the fall of the MTM before a collateral call is made represents the extent to which the bank is taking gap risk. Gap risk, however, can come in other forms. Assuming the MTM continues to decline, and after the first collateral call, there will be a mechanism to make subsequent calls. The increments at which these are set will play a role in the overall gap risk that the bank has exposure to at any point in time. As an example, if 10% of the tranche is initially funded, the first call is set at a negative MTM of 5%, and the call and subsequent calls are set at 2% MTM decreases, the bank will have a gap risk of no more than 5% as MTM deteriorates (refer to Exhibit 4). The other factor that will impact bank gap risk is, if a call is made, the amount of time that passes before the bank has the ability to terminate and unwind the transaction. The longer the period of time before the termination and unwind, the more potential gap risk a bank is taking.

Exhibit 4: Numerical Example

Initial Tranche Notional: \$100,000,000
Initial Funded Amount: \$10,000,000

If the tranche value declines by 5%, the new MTM value would be: \$95,000,000

If trade is unwound, the bank would have \$5,000,000 MTM loss (i.e. \$95,000,000 minus \$100,000,000). This would be netted against the posted amount of \$10,000,000, resulting in a loss of \$5,000,000 to the investor (i.e. \$10,000,000 minus \$5,000,000).

If a collateral call occurred, and the investor posted an additional 2%, then the funded portion would increase to \$12,000,000.

Therefore if the trade is unwound immediately following this call, the bank has a buffer of \$7,000,000 to cover additional MTM volatility (\$95,000,000 minus \$100,000,000 plus \$12,000,000). This represents 7% of the initial portfolio value.

The amount of leverage in the trade also plays a role in call mechanics. As a general matter, the greater the leverage factor, the more likely a call (i.e. for a given threshold call mechanism, calls will be more pronounced). DBRS finds that a leverage factor of no more than ten times works relatively well for most super senior trades, assuming the portfolio is an investment-grade portfolio and there is at least 5% enhancement cushion above AAA. Moreover, such leverage, for a given collateral call mechanism results in a relatively remote probability of collateral calls. As stated before, however, the leverage factor has to be considered in the light of the bank risk model, gap risk tolerance and time decay. The other point that should be made with respect to leverage is that the bank and investor can change the leverage in the transaction over time to readjust the funded amount, and the probability of a collateral call. If the investor funds more of the transaction and reduces the leverage in the transaction, the investor will reduce, if not eliminate, the likelihood of a call. In this sense, the investor has the option to pre-fund a collateral call. Depending on the investor, and their access to funds, this can be an important precautionary feature to avoid a trade termination and a loss due to a negative MTM valuation.

The last factor that impacts MTM valuation is time decay. As time passes, the probability of a negative MTM becomes progressively more remote, assuming the transaction performed in line or better than actuarial expectations. In a five-year transaction, for example, after the first two years, negative MTMs become an extremely remote probability (if the transaction has performed as actuarially expected).

Setting out the Collateral Call Mechanism

Given the factors involved in MTM valuation, the next step is to understand how and when a call will be made. To determine the time and sizing of a collateral call, generally one of two procedures is used:

(1) Pricing grids are developed for the term of the transaction. The pricing grids describe the MTM value, depending on the spread level of the portfolio and cumulative losses for a certain period of time. Usually, the pricing grid is split into finite time periods, with the time periods being shorter at the beginning of the transaction. In this respect, and in the early stages of the life of the transaction, it is not uncommon to have monthly pricing grids. In the later years of a trade, the pricing grids usually move to yearly calculations. The reason for this is that MTM sensitivity is higher in earlier years of the transaction.

(2) The second methodology followed is to use a pricing model that is agreed to by the rating agency, bank, and the investor. The selection of inputs into the pricing model will also be agreed to, or, at the very least, the investor will have the ability to confirm pricing inputs and MTM quotes with other investment banks. The issue with this methodology is that, if the bank changes its pricing model, the investor may be exposed to a discontinuous jump in pricing (and consequent changes in the probability of a call). From DBRS's perspective, as long as the investor can confirm MTM pricing with other dealers, this transaction feature will still retain transparency and fairness for investors.

Apart from the two methodologies outlined, there are a variety of other methodologies that can be used to determine when a call will be made. Critical issues to consider in understanding and evaluating methodologies revolve around: (1) how closely the methodology mirrors the estimated MTM of the tranche; (2) the probability of calls and the size of calls if they occur; and (3) the relative transparency and objectivity of the methodology, such that all participants are comfortable with the terms and conditions of the call mechanism. With the different ways to structure an approach to call mechanisms, each call mechanism must be evaluated on its own merits. A standard analytical approach may be misleading.

While this discussion has spent a significant amount of time dwelling on the possibility of negative MTM values, it should be noted that in most cases, the transaction will nonetheless remain AAA from a credit standpoint. There are two general reasons why this can occur:

- (1) The super senior has to suffer considerable deterioration before a AAA level is reached; and
- (2) The MTM calculation is a function of spread changes and/or cumulative losses. Particularly in the early years of a transaction, large spread movements, without losses, can cause a negative MTM. Having said that, the actuarial risk of the tranche may not have changed. In this respect, it is important to remember that there are salient differences between pricing models and actuarial models of credit risk. Changes in credit spread do not necessarily lead to actuarial impairment.

EVALUATING AND STRUCTURING COLLATERAL CALLS

As noted previously, true credit risk concerns, although evaluated, are usually not the critical point to an LSS transaction. The critical point of an LSS is avoiding a failure to meet a collateral call, with the consequence that the investor will then suffer a loss on a transaction due to a negative MTM when the transaction is still ostensibly a AAA transaction. This is the funding risk implicit with the use of leverage in an LSS transaction.

The inability to meet a collateral call, and the possibility of a loss on a very strong credit risk, raises three issues. The first issue is that the investor should be comfortable with its ability to meet the collateral call mechanism. The second issue is to understand how remote the collateral call mechanism is. The third issue is to design features in the transaction such that the mechanics of the call mechanism can be met by the investor. Each of these issues is discussed below.

Investor Suitability

There are a number of issues with investor suitability. First, the investor should understand the credit and risk dimensions of the underlying transaction. Apart from that, the investor should have plans in place to deal with: (1) the possibility of a collateral call; and (2) the reduction in spread in the transaction as collateral calls are made. In this respect, the leveraged approach may not be suitable for all investors.

Evaluating the Probability of a Call

When the details of the collateral call mechanism are set, DBRS will evaluate the probability of a collateral call occurring. While the probability of a collateral call occurring is independent of the credit risk of the transaction, DBRS will be concerned with this issue where the investor is a conduit. In this situation, DBRS will be concerned with the minimization of call risk as much as possible. The best defence to this risk is to reduce the probability of a collateral call being made in the first place. To evaluate the probability of a call occurring, DBRS will look to the following features:

- (1) The size of the “cushion” for negative MTM, so that only larger, negative MTM movements can cause a possible collateral call; and
- (2) The size of the “cushion”, and the probability of a call based on the “cushion”, is then modelled. In particular, and in conjunction with assumptions about credit deterioration, DBRS will look at the probabilities of spread movement and cumulative losses occurring over the life of the transaction and the implications for

collateral calls. In transactions seen to date, DBRS has found that the greatest sensitivity is early in the life of the transaction, particularly with respect to spread movements. Having said this, these comments are relative since, even in considering spread, spread movements would have to be larger than historical spread widening to trigger collateral calls. In short, when DBRS has evaluated these transactions, the probability of a call has been structured to be quite remote.

Design Features

After reviewing the probability of call occurring, DBRS will look to design features and mechanics that aim to ensure the investor can reasonably meet the collateral calls. The following highlights some key design features:

- (1) Structure the transaction such that the investor can pre-fund, or decrease the leverage in the transaction. Pre-funding and leverage decrease make it far less likely that there will be any forced calls that could lead to a termination of the transaction should such call not be made by the investor.
- (2) If a conduit is the investor, structure the call mechanism such that, if there is a liquidity event, the call mechanism cannot apply. Any call has to wait until the liquidity event has passed.
- (3) If and when a collateral call is made, allow a reasonable number of business days before there is a termination. As noted earlier, this goes to the bank’s gap risk.
- (4) To this point in the study, it has been assumed that the MTM only deteriorates. However, given the impact of time decay, and the remoteness of credit risk, the MTM is likely to gain strength as the deal matures. As such, LSS transactions can be structured to have a two-way collateral call mechanism. Specifically, if one or more collateral calls occurred due to adverse MTM movements, but due to time decay and/or an improvement in the fundamentals of the transaction the MTM has subsequently returned to a value above the initial threshold, the posted collateral could be returned to the investor. Such a two-way collateral call mechanism allows the investor to benefit from improving MTM valuations, and thereby also restores the original leverage and spread. Without this mechanism, the investor's leverage and spread would otherwise be permanently reduced if one or more collateral calls occurred.

APPLICATION OF LSS TRANSACTIONS

LSS applications are becoming increasingly popular with large, sophisticated investors. In a sense, and as noted in this document, the original super senior tranches sold to OECD banks featured leverage since the transaction was completely unfunded (i.e. infinite leverage). The LSS concept plays in the space between fully funded CDO transactions and unfunded CDO transactions. Banks are comfortable with this since they realize the probability of further collateral calls is low and, from a risk perspective, a partially funded LSS is akin to a fully funded transaction.

DBRS sees the LSS market continuing to grow, with significant applications to conduits, structured investment vehicles (SIVs), monolines, pension funds, money market funds, and other large sophisticated buyers. At this stage, DBRS has worked with numerous investors and investment banks to structure these transactions.

While this study is not a place to explore these themes in detail, there are two other analytical points that should be considered. First, the application of leverage outside the structure can also be applied to rated tranches of a CDO, aside from the super senior tranche. DBRS has structured these types of transactions in the past. It is also likely that

more of these transactions will be seen. These transactions are similar to the LSS insofar as they deliver greater return to investors without increasing credit risk. At the same time, however, these transactions also feature the risk of collateral calls. Moreover, because these transactions are less senior in the capital structure of a CDO, the MTM valuation will be correspondingly more sensitive, with a consequently greater risk of collateral calls being made. Given their greater sensitivity to calls, the amount of leverage used in these transactions is considerably less than would be used in a super senior. Again, however, for investors who are able to meet the collateral calls without risk of termination, the application of this feature can be useful in increasing returns.

The second potential application is the interplay between external leverage and time decay. As was noted previously, after the early years of a transaction have been completed, time decay makes the likelihood of a negative MTM increasingly remote. Taking advantage of time decay, and keeping the probability of call equal, leverage can be increased in the later stages of the transaction. Once again, however, these applications are only for sophisticated investors who are able to deal with collateral calls.

CONCLUSION

While it is always difficult to say which particular development is most important in a marketplace, at a minimum, the development of LSS transactions, and some of the leverage concepts involved in the use of LSS transactions, represent significant and positive innovations in the CDO marketplace. From DBRS's perspective, the LSS has broken the link between spread compression and increased credit risk for investors. Moreover, given that collateral calls generally tend to be remote for super senior tranches, LSS transactions provide an important space for

risk-averse investors, while providing a meaningful return for the risk.

To understand and participate in LSS transactions, or some of the variants involving leverage at lower tranches of a CDO capital structure, it is important to be thoroughly knowledgeable about CDOs and the key drivers of LSS credit and collateral call risk. Like any sophisticated product, it must be handled with care.

contact info

Mark Adams

Managing Director – CDOs and Legal

Tel. 416.593.5577 x2238

Fax 416.593.5904

madams@dbrs.com

Manroop Jhooty

Vice President – CDOs

Tel. 416.593.5577 x2280

Fax 416.593.5904

mjhooty@dbrs.com

Jireh Wong

Senior Vice President – CDOs

Tel. 416.593.5577 x2227

Fax 416.593.5904

jwong@dbrs.com

Dominion Bond Rating Service ("DBRS") is a full credit rating agency established in 1976. Privately owned and operated without affiliation to any financial institution, DBRS is respected for its independent, third-party evaluations of corporate and government issues, spanning North America, Europe and Asia. DBRS's extensive coverage of securitizations and structured finance transactions solidifies our standing as a leading provider of comprehensive, in-depth credit analysis.

All DBRS ratings and research are available in hard-copy format and electronically on Bloomberg and at DBRS.com, our lead delivery tool for organized, web-based, up-to-the-minute information. We remain committed to continuously refining our expertise in the analysis of credit quality and are dedicated to maintaining objective and credible opinions with in the global financial marketplace.

New York

One Exchange Plaza
55 Broadway, Suite 1502
New York, New York 10006 U.S.A.
Tel. 212.635.3277

Chicago

101 North Wacker Drive, Suite 100
Chicago, IL 60606 U.S.A.
Tel. 312.332.3429

Toronto

Corporate Office
200 King Street West, Suite 1304
Toronto, ON M5H 3T4 Canada
Tel. 416.593.5577



Dominion Bond Rating Service

www.dbrs.com

© 2005 Dominion Bond Rating Service. All right reserved.