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Abstract: This article provides an introduction to synthetic collateralized debt obligations (CDOs), which have become a large part of the CDO market. Their key feature is that the CDO entity does not actually own the pool of assets on which it retains the risk; a credit default swap allows an institution to transfer the economic risk but not the legal ownership of the underlying securities. The first synthetic CDOs were used for bank balance sheet transactions, allowing institutions to substantially reduce the amount of regulatory capital they are required to hold against their loan portfolios. As the flexibility of the synthetic structure for arbitrage and hedging purposes has become apparent, these types of transactions are now the most rapidly growing sector of the market. The article reviews the basic structures used in the synthetic CDO market and the motivations driving these structures. There are particular challenges confronting rating agencies evaluating these products. [ABSTRACT FROM AUTHOR]

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SYNTHETIC CDOS: AN INTRODUCTION

This article provides an introduction to synthetic collateralized debt obligations (CDOs), which have become a large part of the CDO market. Their key feature is that the CDO entity does not

actually own the pool of assets on which it retains the risk; a credit default swap allows an institution to transfer the economic risk but not the legal ownership of the underlying securities.

The first synthetic CDOs were used for bank balance sheet transactions, allowing institutions to substantially reduce the amount of regulatory capital they are required to hold against their loan portfolios. As the flexibility of the synthetic structure for arbitrage and hedging purposes has become apparent, these types of transactions are now the most rapidly growing sector of the market.

The article reviews the basic structures used in the synthetic CDO market and the motivations driving these structures. There are particular challenges confronting rating agencies evaluating these products.

The market for collateralized debt obligations (CDOs) has experienced rapid growth in the past few years, and synthetic CDOs have become an ever-increasing part of the marketplace. The first synthetic CDO was issued in 1997, motivated by bank balance sheet considerations. It allowed financial institutions to substantially reduce the regulatory capital they were required to hold against their loan portfolios.

Over the next few years, synthetic CDO transactions, similarly motivated, increased in size and importance. Calendar year 2000 saw the debut of synthetic CDOs structured as hedging and arbitrage transactions. We believe the growth potential of synthetic CDOs is enormous.

We review the history and motivations for issuing synthetic CDOs. We then look at basic structures and various structural nuances. We also note the unique challenges confronting the rating agencies in evaluating these products, as well as the key differences between synthetic and non-synthetic transactions.

I. A QUICK REVIEW OF CDOs

A CDO is a special-purpose vehicle that invests in a pool of assets. The timing, amount, and value of the investment are dependent on a set of identifiable risks. Assets funded through the issuance of several classes of liabilities serve as collateral for the CDO liabilities, and repayment of the liabilities is linked to the performance of the underlying assets. Thus, a CDO simply reallocates the risk of the underlying assets to different market participants, depending on their individual risk appetites. Underlying assets most commonly consist of high-yield bonds, loans, emerging market debt, asset-backed securities, investment-grade bonds, and most recently other CDO tranches.

CDOs are one of the fastest-growing fixed-income sectors. Exhibit 1 provides some indication of market growth. It shows the quantity of CDOs rated by Moody's Investors Services. Volume has grown from \$1 billion in 1995 to \$120 billion in 2000.

When the underlying assets are bonds, the CDO is often referred to as a CBO (collateralized bond obligation). When the underlying assets are loans, the special-purpose vehicle may be called a CLO (collateralized loan obligation). CDOs consist of both CBOs and CLOs.

The securities issued by the CDO are tranching into rated and unrated classes. The rating of each class is determined primarily through the priority of the interest in the cash flows generated by the collateral. The senior notes are typically rated AAA, AA, or A, may pay a fixed or floating coupon

(floating is more common), and have the highest priority on the cash flows. The mezzanine tranches are typically rated BBB to B, may pay either a fixed or floating rate, and have a claim on the cash flows that is subordinate to the senior notes. The rating is based on the ability of the collateral to generate sufficient cash to pay interest and principal on the rated liabilities.

The equity in the CDO (often referred to as subordinated notes) is the residual. These securities represent the first-loss position; the coupon may be deferred or eliminated depending on available cash flow. That is, investors in this tranche receive a coupon if cash is available after payment of expenses and the debt service on the securities that rank senior to the equity, and after satisfying tests that require a cushion to be in place to safeguard the higher-rated tranches in future years. The equity in the deal represents a leveraged investment in the underlying collateral.

II. WHAT'S A SYNTHETIC CDO?

In a synthetic CDO, the CDO entity does not actually own the pool of assets on which it retains the risk. This is because the building block for synthetic securitizations is a credit default swap, which allows institutions to transfer the economic risk, but not the legal ownership, of underlying assets.

A credit default swap is similar in concept to an insurance policy. A protection buyer (generally the CDO manager) purchases protection against default risk on a reference pool of assets. Those assets can consist of any combination of loans, bonds, derivatives, or receivables. The protection buyer pays a periodic fee (like an insurance premium), and receives in return payment from the protection seller (the CDO investors) in the event of a "credit event" affecting any item in the reference pool.

The net effect is that the CDO and its investors receive a periodic fee (for shouldering the economic risks on the reference pool), and the CDO pays out to the CDO manager if a defined credit event occurs on those reference assets. This is shown in Exhibit 2.

If a credit event occurs, the intent is that the protection buyer be made whole. The protection buyer should be paid the difference between par and the fair value of the securities. The payout on the credit default swap can take the form of either physical settlement or cash settlement.

In a physical settlement, the buyer of the protection delivers to the seller an obligation of the reference entity that has experienced a credit event. The obligation does not need to be in the reference pool, but it must have the same status in the reference entity's capital structure. The protection seller pays par for the asset that has experienced a credit event, even though its current value may be less, thus making the protection buyer whole.

In a cash-settled swap, the defaulted credit is marked to market, and the protection buyer is paid the difference between par and post-default market value. Most synthetic CDOs have an embedded cash-settled swap.

This de-linking of ownership and the economic risk of the underlying assets provides substantial additional flexibility in bank balance sheet management, as well as for hedging and arbitrage transactions. The value of this flexibility can be seen in the growth of the synthetic CDO market.

III. BRAVE NEW WORLD

Synthetic collateralized debt obligations (CDOs) are a fairly recent product in the CDO market. The very first synthetic deal, Glacier Finance Ltd., was brought to market by Swiss Bank Corporation in August just a few years ago (1997). While synthetic CDOs began as a vehicle for transferring economic risk on European bank loan pools, the favorable capital treatment accorded the structure started attracting U.S. banks as well. The flexibility of the synthetic structure for arbitrage and hedging purposes quickly become apparent. It is useful to place these trends in context.

The synthetic CDO market is growing rapidly. For calendar year 2000, 48 of the 189 Moody's rated deals were synthetic (25%). This compares to only 22 synthetic structures out of Moody's 169 rated deals in 1999 (13%).

Synthetic arbitrage deals are the fastest-growing sector of the rapidly growing synthetic CDO market. All of the 22 synthetic CDOs rated by Moody's in 1999 were bank balance sheet transactions. In 2000, of the 48 synthetic deals rated by Moody's, 32 were synthetic balance sheet transactions, while 16 had other motivations.

The most common motivation is a desire to achieve an attractive leveraged return on assets purchased and hedged with the credit default swap. We generally refer to transactions motivated by something other than bank balance sheet transactions as "arbitrage transactions."

Thirteen of the 16 synthetic arbitrage deals were rated in the fourth quarter of 2000. We expect continued growth of synthetic arbitrage transactions, because the synthetic structure gives a manager greater flexibility than a traditional cash flow structure.

- Synthetic CDOs are just beginning to be used as a valuable risk management tool for dealers. While there are so far a limited number of deals driven by a desire to hedge dealer exposure, we believe this is a potentially very important growth area for the CDO market. Hedging credit risk is more difficult than ever, as credit spreads have been more volatile than ever.

Credit default swaps are an increasingly big business for the dealer community. Alpine Partners L.P., underwritten by UBS Warburg in the fourth quarter of 2000, was the first securitization of derivative exposures. We expect to see more of these types of deals.

We begin our analysis with the advantages to a bank in balance sheet management, then move on to the other types of transactions.

CLOs for Balance Sheet Management

A synthetic CDO allows banks to limit regulatory capital charges and reduce economic risk while retaining ownership of the attendant assets. The best way to appreciate the advantages of this structure is to trace the evolution of bank balance sheet management.

CLOs were the first vehicles to explicitly address the balance sheet needs of commercial banks. In a CLO, a bank sells a pool of loans to a special-purpose vehicle (SPV), and takes back the first-loss piece, i.e., the "equity." There is a huge capital advantage to the bank using a CLO structure. If the bank holds those loans directly in portfolio, it must then also hold risk-based capital equal to 8% of the loans. (Loans are a 100% risk weight item, and capital charges of 8% are levied on these items.)

We set out a typical CLO structure in Exhibit 3. Note that the loans have been transferred to the

SPV, which funds these loans from the cash proceeds of the notes it has issued. The notes are credit-tranched. The senior notes (or commercial paper) are sold at a very tight spread. The mezzanine notes are sold in the marketplace to insurance companies, money managers, banks, and bank conduits. The equity is usually retained by the originating bank. Generally, the senior notes will be about 92% of the deal and the mezzanine notes 4%, with about 4% equity.

From the point of view of the originating bank, the capital implications of this CLO structure are far more favorable than for holding the same loans outright. A bank is required to hold the lesser of 1) the capital charge on the unlevered amount, which would in this case be 8%, or 2) 100% of its liability.

If 100% of a liability is the smaller number, as it generally will be in a CLO structure, we consider that institution subject to low-level recourse requirements. In this case, the maximum liability of the originating bank is 4%. That is, a 100% capital charge on the 4% equity piece requires a 4% capital requirement. And this is precisely one-half the 8% capital required if the bank were alternatively to hold those same loans outright. This is shown in Exhibit 4, which we will refer to throughout the article.

It is important to realize that if the Bank for International Settlements risk-based capital requirements were exactly right, this regulatory arbitrage theoretically would not occur. That is, the buyers of the tranched securities would take into account the actual risk they are bearing, and charge the appropriate risk premium. In fact, however, the BIS requirements are driven by broad categories of assets, and do not adequately reflect the risk of each individual asset class.

Disadvantages of the CLO Structure

From the bank's point of view, CLO structures go a long way toward more efficient capital utilization. Two problems remain, however. First, there is a funding issue; and second, there is a confidentiality issue.

To address the first aspect, most banks are low-cost funders. And it doesn't pay to transfer AAA risk from a low-cost funder to a higher-cost funder, as that higher cost funder cannot profitably fund higher-rated assets. Exhibit 5 shows us why.

Assume that a high-cost funder borrows at LIBOR + 30, while a low-cost funder can achieve a funding cost of LIBOR - 5. Further assume a high-quality asset (loan) paying LIBOR + 35, with the cost of laying off the credit risk on this asset at 20 basis points. After netting out credit risk, the asset yields LIBOR + 15. The high-cost funder could finance this asset only at a deficit of 15 basis points, while the low-cost funder carries the same asset at a surplus of 20 basis points.

This difference in funding costs is important, because CLO financing is relatively expensive. The AAA tranches sell for LIBOR + 35-45. Thus, efficiently managing regulatory capital can cause a bank to accept an inefficient means of financing. (But all is not gloom and doom. Realize that the CLO funding is term funding, which is more advantageous than funding that must be rolled over. It both guarantees availability and avoids the risk that credit spreads may widen.)

The second disadvantage of the CLO structure is one of confidentiality. If a loan is transferred into a special-purpose vehicle for use as collateral for a CLO, borrower notification is always required, and often borrower consent, as well. Banks believe it looks bad to customers to sell their loans

and prefer that they not know. So, customer relationships tend to curb a bank's willingness to sell or transfer customer loan assets into outside pools. These disadvantages are shown in Exhibit 6.

A related disadvantage of the CLO structure is that terms and conditions of loan collateral cannot be modified within the structure. In order to modify any terms and conditions, the specified loan must be pulled out of the pool, and another substituted. The substitution process required entails substantial complications.

Fully Funded Synthetic CDOs

In a fully funded synthetic CDO, notes equal to approximately 100% of the value of the reference pool of assets are issued by a special-purpose vehicle (SPV). The notes are generally tranching by credit quality. The first fully funded synthetic CDO was Glacier Finance Ltd., issued by Swiss Bank in August 1997.

The proceeds of these notes are generally invested in a portfolio of high-quality securities, which is used as collateral. These high-quality assets consist of government securities, repurchase agreements on government securities, or high-quality (AAA) asset-backed securities. Meanwhile, the originating bank enters into a credit default swap either directly or indirectly with the SPV.

Essentially, the originating bank buys default protection in return for paying a premium that subsidizes the coupon on the CDO notes to compensate the investor for the default risk on the reference credits. The mechanics of this are illustrated in Exhibit 7A.

Intuitively, the investor is receiving an interest payment equal to the yield on the high-quality securities plus the credit default swap premium. The investor is, in turn, providing the credit protection to the bank portfolio, which allows the bank to reduce the regulatory capital it is required to maintain.

In synthetic CDOs, just as in the CLO structure, the originating bank retains a first-loss (equity) position, the equivalent of an insurance deductible. That is, the originating institution generally absorbs the first 1.0%-1.5% of losses. This is generally achieved by having the bottom tranche of securities be equity (retained by the originating institution).

An example can make this clearer. Assume that the obligations of the SPV are composed 95% of securities with an AAA rating, 2% of securities with a BBB rating, 2% of securities with a BB rating, and 1% as equity. Moreover, assume 2% of the notional amount of loans experiences a credit event, and that payout on each credit event is 50%.

The trustee would liquidate 1% of the high-quality securities in the collateral account to pay off the originating bank. Interest payments to the equityholders would cease, and they would not receive any principal. If these were the only losses in the course of the transaction, the rated noteholders would receive all monies (both principal and interest) due them. If an additional 1% of loans in the portfolio experience a credit event, also compensated at 50%, an additional 0.5% of the high-quality securities in the collateral account would be liquidated, so the BB security would then take a hit.

Swap Arrangements

The originating bank is usually the protection buyer, and the SPV is usually the protection seller. The credit default swap can be done directly with the SPV. Alternatively, the credit default swap

can be done indirectly with the SPV, by introducing an Organization for Economic Cooperation and Development bank that acts as the counterparty on both sides.

The originating bank (protection buyer) enters into a credit default swap with an OECD bank (protection seller). This OECD bank (the protection seller) offsets the risk on that first swap by entering into another swap with the SPV, with the OECD bank as the protection buyer and the SPV selling the protection. These back-to-back swaps have the economic effect of mitigating the risk for the OECD bank, and they leave the originating bank as the protection buyer and the SPV as the protection seller.

This is illustrated in Exhibit 7B.

While these structures are conceptually similar, there are subtle differences. If the swap is done directly with the SPV, the capital treatment for the originating bank will depend entirely on the risk weight of the investments of the SPV. That is, if the SPV invests the assets solely in cash, cash substitutes, or Treasury securities, the risk-based capital charge associated with the swap is 0%. If the SPV invests in AAA assets with a current risk weight of 100%, risk-based capital charges then become a prohibitive 8%.

Introducing the intermediary bank changes the risk-based capital treatment. If the risk transference between the originating bank and the SPV occurs indirectly, via introducing another OECD bank as an intermediary, the risk-based capital charge on the swap is 20%. Essentially, since the credit risk of the underlying asset has truly been transferred to the protection seller, the risk weighting of the underlying assets (the loans) is replaced with the risk weighting of the protection seller. Under BIS guidelines, the risk weighting of another OECD bank is defined as 20%.

Thus, when setting up the synthetic CDO, the originating bank must decide whether it is more favorable to 1) limit the collateral account to 0% risk weight assets, which will constrain the choice of high-quality assets that can be used; or 2) introduce an OECD bank as intermediary, and incur capital charges on a 20% risk-weighted asset.

Capital Requirements

The capital requirements on synthetic transactions are quite a bit lower than on either holding the loans on balance sheet or doing a CLO. And, the capital requirements for U.S. banks are lower than for European banks, as most European banks are subject to the risk-based capital guidelines set by the Bank for International Settlements (BIS). Each country has the right to make modifications to the BIS rules, and U.S. regulators have chosen to do so in this instance. Since the majority of synthetic CLOs have been done by European banks, we first go through the capital requirements as per the BIS, and use this for the exhibits.

The BIS risk-based capital guidelines require that the equity that is retained by the originating bank will always carry a 100% risk weight. Assume this equity portion is 1%, as is shown in Exhibit 4. Additional capital requirements depend on whether there is an intermediary bank.

Absent an intermediary bank, and if the SPV invests entirely in 0% risk-weighted assets, the capital charge on the swap is 0%. Thus, the total capital charge on the CDO would be just the retained equity of, say, 1%.

If there is an intermediary OECD bank, the risk-based capital requirement on the swap is 20% of 8% (equaling 1.6%) of the notional amount of the credit default swap. Thus, if a bank enters into a fully funded synthetic CDO with a 1% first-loss position, the capital requirement is 100% of the first-loss piece, plus the risk-based capital requirement on the credit default swap. This would mean a capital charge of 2.6%.

The U.S. bank regulators allow for even lower capital charges for U.S. banks. The regulators (the Federal Reserve and the Office of the Comptroller of the Currency) describe two approaches, and require banks to use the approach that results in the higher value. The first approach is to hold a dollar-for-dollar loss against the first-loss position. On a 1% first-loss position, this would be a 1% capital charge.

The second approach would be treated as a direct credit substitute, and would be assessed an 8% capital charge against its face value of 1%. The second-loss position, if collateralized by Treasury securities, would have no capital charge. If guaranteed by an intermediary bank, it would be assigned to the 20% risk category. Thus, under this approach, using our example, the capital charge would be $[0.08 \times (0.01 + (0.2))]$, or 1.68%. Since this is higher than the 1% charge under the first approach, it would be the applicable charge.

Advantages and Disadvantages of the CDO Structure

Now let's focus on the advantages of the synthetic fully funded CDO, as shown in Exhibit 6. First, the structure is confidential with respect to the bank's customers. None need be notified that their loan is being used within this structure, as the loan clearly stays with the bank. The names in the reference pool must be provided to the protection seller, but need not be publicly disclosed. For European banks, this point is particularly important, as selling a loan into an SPV is looked at by many as compromising a customer relationship. This explains the prevalence of the synthetic CLO structure there.

Second, the bank has the flexibility to use the contract as a hedge for any senior obligation of the reference entity (including not only loans, but also instruments such as bonds, derivatives, or receivables). Third, the capital treatment is favorable.

The disadvantage of a fully funded synthetic CDO is that the loans must be funded by a high-cost funder (the marginal buyer in the capital markets) rather than a low-cost funder (the bank itself). Moreover, in a fully funded structure, the amount of notes issued is approximately the same as the amount of loans backing the credit default swap (hence the nomenclature). This means there's quite a bit of funding required, and hence a high cost associated with the reduction in required regulatory capital. This is again summarized in Exhibit 6.

Partially Funded Synthetic CDOs

The building blocks are the same in a partially funded structure, but the notes issued amount to only 5%-15% of the notional amount of the reference portfolio. Partially funded synthetic CDOs deliver the favorable capital treatment while achieving more favorable funding than do fully funded CDOs. As a result, partially funded CDOs are far more common than fully funded structures.

The first partially funded synthetic CDO was the BISTRO transaction, pioneered by J.P. Morgan in December of 1997. BISTRO stands for broad index secured trust offering.

The structure of partially funded synthetic CDO transactions is very similar to that of fully funded CDOs. The originating bank buys protection on a portfolio of corporate credit exposures via a credit default swap, either directly or indirectly, from an SPV. This is shown in Exhibit 8A. Thus, the originating bank is the protection buyer and the SPV the protection seller.

As in fully funded transactions, there may or may not be an intermediary OECD bank that sells the credit protection to the originating bank and buys it back from the SPV. In the BISTRO transactions, there is generally an intermediary bank, while in most other partially funded transactions, the credit default swap is directly between the bank and the SPV.

The partially funded structure in which there is an OECD intermediary is shown in Exhibit 8B. The credit protection is usually subject to a threshold level of losses (equivalent of a deductible) that must be experienced on the reference portfolio before any payment is due to the originating bank under the portfolio credit swap. This is accomplished by having the originating bank hold the equity issued by the SPV.

The SPV is collateralized with government securities, repurchase agreements on government securities, or other high-quality collateral, which it funds through issuance of notes. Those notes are credit-tranched, and sold into the capital market.

In a critical departure from traditional fully funded securitization, the SPV issues a substantially smaller amount of notes, and holds substantially less collateral, than the notional amount of the reference portfolio. This is clearly shown in Exhibits 8A and 8B. Typically, the note issuance will amount to only 5%-15% of the notional amount of the reference portfolio. Thus, only the first 5%-15% of losses in a particular portfolio are funded by the vehicle, which leaves the most senior risk position unfunded.

Realize that the unfunded portion--known as the super senior piece--is a very high-quality piece of paper. Given the quality of the underlying reference portfolio, there's only a remote probability that a loss might exceed the 5%-15% of the exposure that has been funded. The unfunded (super senior) piece is, in essence, better than an AAA credit risk.

Another way to look at this is to realize that some of the credit support below the super senior piece is often still rated AAA. (The senior tranche issued by the SPV, which absorbs losses before they hit the super senior piece, is often rated AAA.)

In bank balance sheet transactions, the risk on the super senior piece can be laid off via a second credit default swap, often referred to as the super senior credit default swap, again shown in Exhibits 8A and 8B. And the swap on the funded portion of the transaction is often referred to as the junior credit default swap.

Capital Treatment

In a partially funded structure, the super senior piece is often afforded the same capital treatment whether or not the risk is laid off on another OECD bank. If the risk is laid off via a credit default swap on another OECD bank, the bank will be afforded a 20% risk weight. If the risk is not laid off, but is retained by the originating bank, the bank may still qualify for a 20% risk weight.

On November 15, 1999, the Federal Reserve issued a set of capital interpretations on synthetic CLOs that apply to U.S. banks. (*) These guidelines allow the retained super senior piece to

achieve a 20% risk weight, at long as a number of conditions are met, including the presence of a senior class of CDO notes that receives the highest possible rating (i.e., AAA) from a nationally recognized credit rating agency. Prior to this interpretation, if the risk on the super senior piece were not laid off, there was no capital relief, and the risk weight was 100%. For European banks, the treatment will vary jurisdiction by jurisdiction.

The regulatory capital charge on the equity and on the junior credit default swap follows the same rules as on the fully funded synthetic (summarized in Exhibit 4). Again, this reflects the BIS methodology. If the junior swap is done directly with the SPV, and the SPV is collateralized with 0% risk-weight assets, the assets backing the junior swap have a 0% risk weight. The capital charge on this would be 100% of the first-loss piece (the equity portion), plus the capital charge on the super senior credit default swap.

Assume again a 1% first-loss piece, and assume that the junior credit swap is for 10% of the transaction amount. Thus, the super senior portion is 90% of the notional amount. The credit charge on this portion is ([the 20% risk weight] X [the 8% capital charge] x [90% of the notional amount]), or 1.44%. Thus, the total capital charge is 2.44% (1% on equity + 1.44% on the super senior swap).

If an OECD bank serves as the protection seller to the originating bank on the junior default swap, the 20% capital charge would apply to 100% of the notional loan amount. Thus, the capital charge would be [20% of 8%], or 1.6%. The total capital charge on the transaction would be [the capital charge on the swaps] + [the capital charge on the equity], or 2.6%.

Under U.S. bank regulation, the capital charges would be somewhat lower. If the junior credit default swap were collateralized by Treasuries, the capital charge would be 8% on the 1% first-loss position (direct credit substitute rule) plus 8% X 20% on the 90% super senior piece, for a total of 1.52%. (This is obviously higher than a dollar-for-dollar charge on the 1% piece that is retained.) If an OECD bank acts as the protection seller on the credit default swap, the direct credit substitute rule would apply on the 1% first-loss piece, and a 20% risk-based capital requirement would apply on 100% of the notional amount, for a total capital charge of 1.68%.

This partially funded structure has several advantages. It allows banks to reduce the risk on a large number of on-balance sheet assets. Confidentiality is also preserved, as is a funding advantage (since only 5%-15% of the loans are funded). Finally, favorable regulatory capital treatment is achieved, as shown in Exhibit 6.

Hedging Transactions

While the overwhelming majority of synthetic CDOs have been driven by regulatory capital treatment for banks, a few came from the desire to hedge on- or off-balance sheet trading exposures. While those driven by a desire to hedge dealer exposure have thus far been very limited, we believe this is potentially a very important growth area for the CDO market. It is also a potentially important risk management tool for dealers.

For dealers, hedging credit risk is more difficult than ever, as credit spreads have been more volatile than ever historically. Moreover, default rates on high-yield securities are higher than at any point since 1991. Partially mitigating the credit risk on an inventory of trading positions (either bonds or positions in the swap book such as credit default swaps or total rate of return swaps) is

very valuable for a dealer.

It is not unreasonable to think that if this method were to become a trusted credit risk management tool, dealers would be willing to hold larger inventories, as they would be able to lay off more of the risk than is now the case.

The first of such hedging transactions was Alpine I. This transaction was done to hedge the risk on the UBS Warburg credit default swap desk. Many institutions are looking at these types of transactions, and the potential seems enormous. Like the bank balance sheet deals, hedging transactions allow an institution to de-link ownership and economic risk, and transfer economic risk on an item that is otherwise difficult to hedge.

Arbitrage Transactions

Unlike balance sheet transactions, which are used exclusively by banks, or hedging transactions, which are limited to the dealer community, arbitrage transactions are used by money managers. All arbitrage transactions in the CDO market are driven by the opportunity to redistribute risk in a profitable manner. All synthetic arbitrage transactions are driven by some perceived pricing inefficiency between the cash market and the market for credit default swaps.

In some arbitrage transactions, a hedge fund or dealer arbitrage desk will purchase a portfolio of bonds. The intent is that portfolio default risk will be mitigated by the credit default swap sold (or the CDO), as the bond portfolio then becomes the reference portfolio for the CDO. The arbitrage is created because the issuer believes that spreads on the underlying assets are wider than warranted by the cost of laying off the default risk. Structured securities (ABS, CMBS, CBOs) have been used on the majority of the arbitrage structures to date.

In other arbitrage transactions, there is no underlying bond portfolio. The manager believes that it is more economical to sell a portfolio of credit default swaps than it is to buy and manage a cash portfolio. These transactions can be done with a static pool of reference assets, or a pool whose reference assets can change over time. Thus, the returns to the CDO investors come from the premiums on the credit swaps, plus the cash investments.

Structural Issues--Hedging- and Arbitrage-Driven Transactions

Hedging- and arbitrage-driven transactions are structured the same way as the bank balance sheet restructuring CDOs. The hedging- or arbitrage-driven transactions may be fully or partly funded, with the primary determinant being the type of underlying collateral constituting the reference pool. For bond collateral, partial funding is the norm. For off-balance sheet collateral, full funding was required at first, as rating agencies have little experience with the loss experience, although at least one recent transaction used a partially funded structure.

The position to be hedged, or the arbitrage portfolio that has been purchased, becomes the reference portfolio for the credit default swap. In this type of structure, the hedging institution is buying protection against credit events, which it purchases from a swap counterparty. The swap counterparty in turn lays off the risk of the credit default swap onto the SPV. The SPV then becomes a protection seller, and the originating institution the ultimate protection buyer.

Just as in the bank balance sheet deals, the SPV issues notes, whose proceeds are invested in a portfolio of high-quality securities. In the aggregate, the investors receive [coupon equal to the

premium on the credit default swap] + [yield on the risk-free assets].

Hybrid Transactions

A number of traditional CDOs also have a synthetic component, at least initially, as the needed assets were either unavailable during the ramp-up period, or the assets available did not allow for appropriate diversification. Assume a money manager is ramping up a high-yield deal, but most of the recent issues have been telecom, so a sufficiently diversified portfolio cannot be easily purchased. The non-telecom exposure could be provided via a credit default swap. This swap could be unwound as other bonds become available. Similarly, during a short ramp-up period, there may not be enough diversification in emerging market bonds, and a money manager may want to add exposure to a given area (say, Asia) via a credit default swap.

The mechanics of the trade are quite simple. Assume that the CDO needs non-telecom exposure. The money manager would sell a credit default swap on behalf of the CDO; the reference assets will be a select group of non-telecom names. When the desired cash bonds are obtained, the credit default swap could be bought back.

Alternatively, the money manager could sell the credit default swap for a short period, say, six months, and see where the deal ramp-up is at the point the swap ends. If more time is needed to buy in cash bonds, another credit default swap (perhaps on a smaller amount, depending on ramp-up efforts) could be sold for a limited period.

IV. CREDIT EVENTS AND DISCLOSURE

The rating agencies face a number of unique difficulties in rating these transactions. While each uses a slightly different approach, they all tend to rely on historical default and loss information. There is a considerable amount of such information on bonds and loans. In the credit default swap inherent in a synthetic CDO, however, a credit event need not correspond with what would have been a traditional default. In fact, credit events include restructurings, as well as cross-default/cross-acceleration clauses.

This is an issue that has received considerable attention in both the dealer and the rating agency communities. Tolk [2001] makes the point that Moody's has compiled more than 80 years of corporate default data. This amount of data allows Moody's to assign a probability of default to each rating category over a given time period. For example, Moody's can estimate that according to historical data, a firm rated Baa3 has a 6.1% chance of defaulting over a ten-year period.

There are no comparable data for corporate events such as loan accelerations and debt restructurings. Tolk notes that:

if the loss trigger events under the swap are broader than the events Moody's considers to be "defaults" the actual expected loss posed to investors may be greater than the expected loss incorporated in the Moody's rating of the reference portfolio [2001, p. 5].

For a rating to adequately capture the risk to the investor, the rating agencies (particularly Moody's) would like to narrow credit events to the traditional definition of defaults. This would give the rating agencies comfort and allow them to use the extensive historical default data they have painstakingly collected over the years.

Over the past few years, at the insistence of the rating agencies, great strides have been made to

narrow the definition of credit events to correspond more closely to the traditional definition of bankruptcy.

Disclosure Issues for Rating Agencies

Banks initially argued in the early days of the synthetic CDO market that under English law they cannot disclose the names of reference entities or reference assets, even to rating agencies. In fact, a number of very early deals were rated with truly "blind" pools, in that even the rating agencies had not "seen" the credits.

The rating agencies soon found that unacceptable. They cannot maintain ratings on synthetic securities for which they do not know the contents of a reference pool. Moreover, they are quite aware of the incentive to include reference obligations having a higher chance of needing credit protection.

We term this the moral hazard problem. Accordingly, the rating agencies made it very difficult to obtain a rating on any synthetic deals in which the pool was blind to them (as they rightfully should have). At that point, the banks decided that secrecy did not mean non-disclosure to the rating agencies, so reference asset lists are now generally made available to those agencies.

Disclosure Issues for Investors

Disclosure to investors has been a much slower process. In early deals, investors were simply informed that a protection payment was made to the deal manager/issuer. There were no provisions permitting investors to know the reference entities or assets (contrary to the banks' confidentiality argument).

While the rating agencies have focused on the quality of disclosure to them, disclosure to investors has not been viewed as a rating agency issue. Some investors are now beginning to insist on better disclosure, in order to allay their fears as to what is in the reference pool. As a result, there has recently been a trend toward better disclosure to investors.

We believe the trend of increased disclosure is very healthy. Investors really should demand to see the list of reference entities and assets. But managers are reluctant to share this information on a real-time basis, which is equivalent to making public all purchase and sale information. (Doing so would allow competitors to enter into the same trade, even before the original manager is done; it also allows dealers to raise prices on the bonds the manager is buying.)

The compromise that evolved is that information on reference assets is released on a lagged basis. In a typical recent deal, the swap counterparty must provide in writing to the issuer, the indenture trustee, and the initial purchasers, within 14 days after each periodic payment date, the names of reference entities and notional amounts that are subject to the credit swap on the immediately prior periodic payment date. Thus, assuming quarterly payment, the information is subject to a lag of 104 days (90 days between quarterly payments + 14 days after the last payment date). Summary information is often provided with less of a lag.

Market Discipline

Why should investors insist on increased disclosure? And what difference does it make? If investors see the reference entities, they can figure out if an issuer is abusing the potential for moral hazard inherent in these deals--that is, deliberately putting low-quality reference entities on

the list. If the issuer is doing so, the investor can sell the deal.

Secondary market players, however, still face wide bid-offer spreads. More important, disclosure of abuse will severely taint the ability of this issuer to sell another deal. If an investor never gets to see the reference entities, it is harder to establish a pattern of abuse.

Another important reason for investors to be firm about increased disclosure is that they can do a better job monitoring their CDOs, and can be more proactive about selling tranches that they deem have a high proportion of reference entities with event risk. Event risk will not be apparent to investors unless they can see what is in the pool.

That is, an investor may look at a given pool, and perhaps see that there is a high exposure to the tobacco industry, or a concentration of issuers vulnerable to asbestos litigation. The investor can then make an informed choice as to whether to hold or sell a CDO tranche.

Some investors think this unfairly penalizes loan deals (disclosure is now more difficult due to confidentiality issues) versus bond deals (no such issues). Yes, it does penalize loan deals. But this is not unfair, as it is harder to enforce market discipline in these deals.

V. STRUCTURAL DIFFERENCES BETWEEN CASH AND SYNTHETIC DEALS

There are a number of structural differences between a synthetic CDO and a CDO backed directly by bond or loan collateral. These differences all stem from the fact that ownership and economic risk of the securities or exposures have been de-linked.

The term of the synthetic instrument is well defined. The investor is not dependent on the cash flows of an underlying bond or loan instrument. The maturity of the instrument is governed solely by the maturity of the underlying credit default swaps.

On the synthetic CDO, there is no interest rate risk, either at initial investment or at liquidation. This is because the credit default swap addresses only the credit risk on the instrument. If there is no credit event, but the security is worth considerably less at liquidation, that is not the problem of the rated noteholder.

The synthetic CDO cannot benefit (or lose) on any discretionary trading done in the portfolio. The results of this discretionary trading would be reflected in higher (lower) market values when the security is eventually sold, but the synthetic is not dependent on changes in market values.

VI. CONCLUSION

Synthetic CDOs have grown tremendously in a short period of time. Bank balance sheet deals have increasingly been effected in synthetic form rather than in CLO form. Calendar year 2000 marked the debut of synthetic hedging and arbitrage deals.

These deals have been increasingly popular, and we believe they represent a huge growth area for the CDO business. Understanding the structure of synthetic CDO deals is critical, given their market importance.

ENDNOTE

(*) See "Capital Interpretations" [1999], found on the Federal Reserve's website.

EXHIBIT 1 Global CDO Issuance Volume (Rated by Moody's)

1994

888

1995	1,045
1996	13,588
1997	49,831
1998	82,943
1999	88,949
2000	12,000

DIAGRAM: EXHIBIT 2 Credit Default Swap

DIAGRAM: EXHIBIT 3 Structure of a CLO

EXHIBIT 4 Comparison of Capital Charges

Legend for Chart:

- A - Type of Security
- B - Equity Retained
- C - Capital Charge Methodology
- D - Capital Charge Incurred

A	B
	C
	D
Hold Loans on Balance Sheet	n.a.
	100% risk weight, 8% risk-based capital (RBC) requirement.
	8%
CLO	4%
	Low-level recourse requirement: lesser of the capital charge on the unlevered amount or 100% of bank liability.
	100% of 4% equity retained = 4%
Fully Funded	1%

Synthetic CLO

Low-level recourse requirement on equity. 20% risk weight on credit default swap if swap is with OECD institution. 0% risk weight if swap is with SPV and fully collateralized with 0% RBC securities (cash, cash substitutes, or Treasuries).

If credit default swap is with an OECD institution: 100% of 1% equity + $(20\% \times 8\%)$ on swap = 2.6%

If credit default swap is collateralized with 0% RBC securities:
 100% of 1% equity + 0% on swap = 1%

Partially Funded Synthetic CLO 1%
 (10% junior credit default swap,
 90% senior default swap,
 always with OECD institution)

For U.S. banks and many European institutions, the super senior piece always receives a 20% risk weight, whether it is retained or laid off. Treatment on equity and junior credit default swap is the same as above.

If junior credit default swap is with OECD institution: 100% of 1% equity + $(20\% \times 8\%$ on swaps) = 2.6%
 If junior credit default swap is collateralized with 0% RBC securities:
 100% of 1% equity + $(0\% \times 10\%$ junior swap) + $(20\% \times 8\% \times 90\%$ on super senior swap) = 2.44%

EXHIBIT 5 Comparison of Transfer of AAA Risk from Low-Cost Funder to High-Cost Funder

Legend for Chart:

B - Low-Cost Funder
C - High-Cost Funder

A	B	C
Yield on high-quality asset	LIBOR +35	LIBOR +35
Less funding cost	LIBOR -5	LIBOR +30
Less cost of laying off the credit risk	20 bps	20 bps,
Net excess return	20 bps	-15 bps

EXHIBIT 6 Comparison of Bank Balance Sheet Management Techniques

Legend for Chart:

A - Option
B - Achieve Capital Relief?
C - Achieve Confidentiality?
D - Wide Range of Assets Allowed?
E - Achieve Favorable Funding?

A	B	C	D	E
Leave assets on balance sheet	No	Yes	Yes	Yes
CLO	Yes	No	No	No
Fully funded CDO	Yes	Yes	Yes	No
Partially funded CDO	Yes	Yes	Yes	Yes

DIAGRAM: EXHIBIT 7A Fully Funded Synthetic CDO

DIAGRAM: EXHIBIT 7B Fully Funded Synthetic CDO

DIAGRAM: EXHIBIT 8A Partially Funded Synthetic CDO

DIAGRAM: EXHIBIT 8B Partially Funded Synthetic CDO

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