

# Risks and Risk Management of Collateralized Debt Obligations

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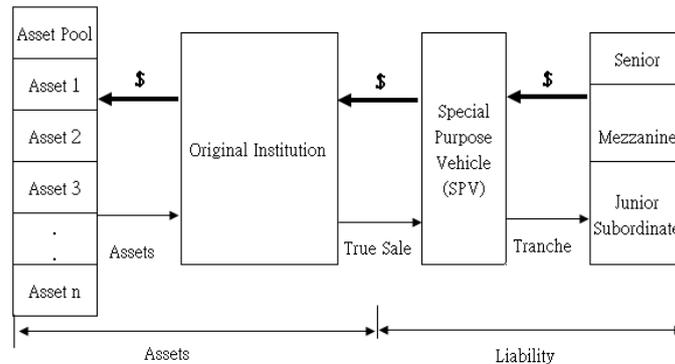
## ABSTRACT

*Collateralized Debt Obligations (CDO) refers to a portfolio of investment tools, some of which may be homogeneous while others are heterogeneous in nature. This article is intended to address the risks and risk management of CDO. It begins by demonstrating the basics of CDO, including its functions, types and structure. The introduction of CDO into the financial market and their performance since their inceptions are then discussed. The article then looks at the various types of risks associated with CDO and the main reasons behind the recent slump of subprime mortgage CDO. Special attention is given to the various measures of CDO risks. This discussion is followed by an illustration of asset-backed securitization and its importance in the CDO market. In the end, the article delves into the future of the CDO market, particularly as far as the role of advanced technology in this market is concerned.*

**Keywords:** Collateralized Debt Obligations, investment, risk management

## INTRODUCTION

Collateralized Debt Obligation (CDO) represents a wide variety of structured investment products. These products are normally maintained by a broad range of essential securities, such as bonds, credit default swaps, loans and asset-backed securities, as well as by more unusual collaterals, such as equity default swaps and Collateralized Debt Obligations tranches from external sources. A CDO raises money by offering debts and equities to investors. The money raised is then invested in a pool of financial assets which are either corporate or structured. The proceeds from the assets are then distributed to the investors according to the level of liabilities and their associated risks (Lucas, Goodman and Fabozzi, 2009, p.2) as shown in figure 1.

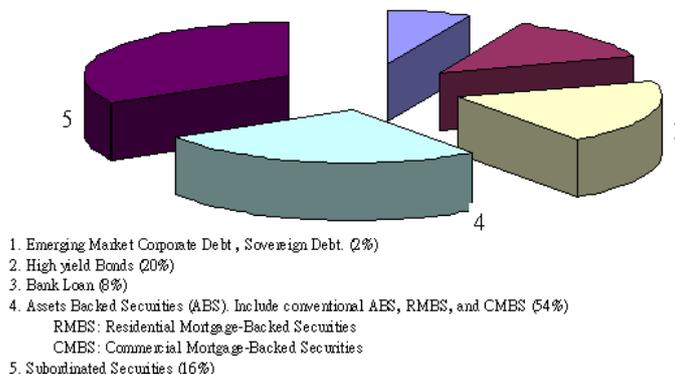


**Figure 1. Assets Pool of CDO**

The makeup of any CDO depicts the volume and amount of tranches and the policies governing the distribution of the security profits to the tranches. These policies and makeup differ widely from one collateral deal to another. For instance, interest payments to the tranches are made in accordance with the position of the tranche on the tranche ladder. Morokoff (2003, p.1) states, “the structures may be simple pass-through, whereby interest payments are made in order of tranche seniority.” In other cases, the rules may require that interest payments be made on the basis of the value and the performance of the principal securities. In short, each CDO deal has an exceptional makeup made to suit the current market situation, the features of the underlying securities and the demand of the investors at the time the CDO deal is struck. Despite these variations, a majority of the CDOs are structured in a manner that will guarantee that, as far as

credit worth is concerned, the highest-ranking tranche is given the highest rating by the debt rating agencies. CDO deals are officially instituted as Special Purpose Entities (SPE).

A Special Purpose Entity acts as an autonomous company. To this end, any CDO deal has four major attributes which enable it to run as a company. These attributes include: assets, liabilities, purposes and credit structures. The assets of a CDO are financial in nature and vary widely from corporate loans to mortgage-backed collaterals as shown in figure 2. As an independent company, a CDO deal has liabilities, including preferred dividends and AAA-rated senior liabilities. Besides assets and liabilities, CDO deals are characterized by credit structures which fall into one of two groups: cash flow and market-value protections. Lastly, CDO deals are created to fulfill such purposes as reducing a balance sheet, reducing the requisite regulatory and financial capitals, reducing funding costs, obtaining assets under management and management costs, and increasing equity capitals (Lucas et al., 2009, p.4).



Source: The Bond Market Association.

**Figure 2. Assets Pool of CDO**

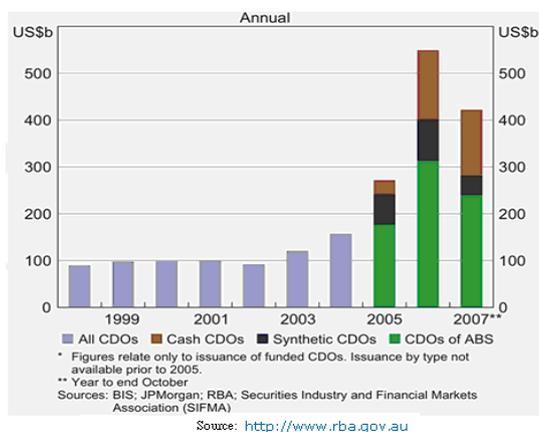
The capital makeup of a CDO deal is very basic in nature: the assets owned are the pool of securities, whereas the liabilities are the tranches offered to the public or private entities. Individuals or companies interested in CDO deals buy the tranches, and the proceeds from the sale of the tranches are then used to buy the assets. Every three or six months, the interest earned on the assets, together with the principals, are gathered and deposited into accounts. The cash flows are then used to make payments to the tranches. According to Morokoff (2003, p.1) stated, “the set of rules for how the funds are distributed at a given payment date is known as the cash flow waterfall for the CDO.” In a normal waterfall, the rules stipulate that taxes and management costs be compensated for first, followed by the interest accruing to the most senior tranche, i.e., one who invests the highest amount of principal (between 75% - 90%) but receives the smallest interest. The reason behind this is the fact that the possibilities of risks and losses reduce as one move up the tranche ladder because the most senior tranches get paid first.

The lowest-ranking tranche, at the foot of the waterfall, is referred to as an equity tranche. This tranche normally does not get a prearranged interest as do its more senior tranches. Rather, the junior tranche gets the remaining interests after the CDO has paid the senior tranche. Because of this, junior tranches bear the highest possibilities of risks and incurring losses. On the other hand, the equity tranche can also perform well, especially in situations involving significant excess spread (i.e., the sum of interest earned by the security pool above what is payable to the tranches). However, as more and more defaults transpire in the collateral pool, the sum of excess spread reduces. Under such circumstances, the equity tranches become the first lot to suffer losses from the investment. Many CDO deals avert proceeds away from the junior tranches when the performance of the collateral falls consistently. As Morokoff (2003, p.1) states, “many deals have collateral quality triggers that divert all cash flows away from the equity if the collateral quality deteriorates too much.”

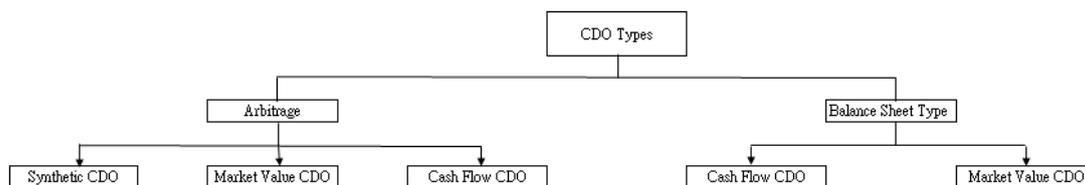
The collateral supervisor of a CDO deal is accountable for supervising the security assets as their credit quality revolutionize. This entails purchasing and trading assets, in addition to investing back the money that has been obtained from defaulting or budding names. The ability and approach used by the manager to manage the security pool can have

a significant impact on the functioning of the collateral deal. As far as risk management is concerned, the most crucial aspect that impacts the functioning of a CDO deal is the sum of losses in security-pool value over the existence of the deal as a result of associated defaults within the pool. Every tranche can endure a certain amount of loss on the security pool before it fails to earn its expected interest and principal. The performance of a CDO deal is also highly impacted by the instance of the defaults, especially for a junior tranche. Other risk factors that affect the performance of a CDO deal include the rates of interest, the rates of maturing, the prepayment of the securities and the rates of recovery on the defaulted security. Most importantly, the price risk, which is the variation in the worth of the collateral resulting from the quality of the credit, the rates of interest and reinvestment risks, also affects the performance of any CDO deal (Morokoff, 2003, p.2).

Introduction of CDOs into the financial market Collateralized debt obligations (CDOs) were first launched into the financial market in 1987. CDOs make use of the securitization expertise which was initially employed to create housing mortgage-backed collateral. With time, CDOs became popular among the investment elite and in 1998 alone more than \$100 billion worth of CDOs were issued. Indeed, CDOs “were the fastest growing investment vehicles of the last decade,” (Goodman, Lucas and Fabozzi, 2007, p.62) as shown in figure 3. CDOs are of different types, as shown in figure 4, and include collateralized loan obligation, balance sheet CDOs and arbitrage CDOs. A collateralized loan obligation (CLO) is a CDO whose portfolio includes corporate loans. These CLOs were initially used by financial institutions to shift the risk involved in a collateral pool of commercial banks. A balance sheet CDO on the other hand is mainly used for risk management dealings. Lastly, arbitrage CDO is a CDO that is used to capture the difference between the security portfolio and the cost of the loan offer. Since its inception, the CDO market has expanded to the extent that it leads in the underlying security markets especially the high-yield loans, mezzanine mortgage asset-backed collateral, and trust preferred debt (Goodman, Lucas and Fabozzi, 2007, p.62). The high-yield loans, mezzanine mortgage asset-backed securities and trust preferred debt are the backbone of the American CDO market and comprise 35%, 20% and 5% of the underlying securities respectively. The issuance of CDOs that are supported by these three collaterals has consistently risen thereby leading to a rise in the collateral’s issuance and a reduction in the collaterals’ distribution.



**Figure 3. Global CDO Issuance**



Source: Synthetic CDOs, Structured Finance, Fitch Ratings

**Figure 4. Types of CDO**

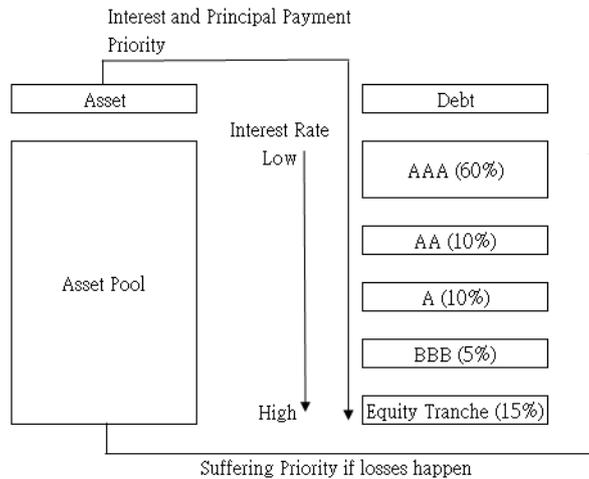
## **CDOs and the Real Estate Market**

The housing market has suffered numerous recessions in the past. However, unlike the previous setbacks, the current housing recession has wreaked the greatest havoc in the financial market due to write-offs on collaterals associated with subprime mortgages. The write-downs approached \$400 billion by the end of 2008, with the cost of the housing slumping nearing \$1 trillion (Kim, 2008, p.48). All parties of the collateral and the housing markets, including investors, lenders, borrowers, federal regulators and the rating agencies, have been held accountable for the slump. The risk involved was speculated at two points: the level of the mortgage agreement and the level of the mortgage portfolio tools. The risk levels speculated by some lenders ought to have been supervised by the regulatory bodies and intervening strategies undertaken where required. The opaqueness of the security instruments making up the security portfolio necessitated additional caution by the rating agencies, a factor that was rarely implemented. The American government regulators were conscious of the impending challenges facing the industry right from the beginning. In 2001, an “expanded guidance intended to strengthen the examination and supervision of institutions with significant subprime lending programs” was issued by the Federal Reserve System, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, and the Office of Thrift Supervision (Johnson and Neave, 2008, p.15). The instructions provided standards and principles that were to be followed for loan and lease losses, loan assessment and categorization, recovery programs and unethical lending. Unfortunately, because the four federal banking agencies had no authority over the rate of conformity and assessment, a majority of the concerned parties failed to adhere strictly to the guidelines. The purpose of the rating agencies also needs to be mentioned. Lenders as well as borrowers need to be aware of the risk and profit features of their prospective ventures. Adequate risk analyses and ratings are especially important when dealing with opaque collaterals that bear a number of underlying tools. The reduction in the worth and real default of a number of these tools which initially had high ratings, along with the high incomes earned by the rating agencies, has raised concerns about the thoroughness of the rating agencies in assessing and supervising the collaterals. However, the biggest blame seems to rest on the models used by the rating agencies to rate CDOs.

## **CDO Rating Models and the Current Financial Crisis**

There are a number of rating agencies, e.g., Standard & Poor’s, Fitch and Moody, whose major interest is in the potential risk that any investor of a CDO is faced with. These agencies, therefore, provide investors with information and advice on the likelihood of incurring risks from particular collateral. This is normally done with model-based computations which may vary from one rating agency to another. However, of importance to each computation is an evaluation of the probability that a tranche will face certain losses during the lifetime of a CDO deal. In the past, losses were defined based on a buy-and-hold approach and were therefore restricted to losses as a result of defaults. More recently, this definition has expanded to include losses resulting from mark-to-market risks (Servigny and Jobst, 2007, p.295). The models used by rating agencies had several weaknesses which rendered them incapable of evaluating the credit risks involved in the sub-prime mortgages. Kim (2008, p.49) stated, “...given the size of the market failure, it’s fair to question the methodology that the rating agencies used to assign credit ratings to sub-prime collateralized debt obligation tranches.”

Between 2005 and the third quarter of 2007, close to four-fifths of all sub-prime mortgages were transformed into AAA portfolios. A tool supported by sub-prime mortgages could obtain four-fifths of an estimated sum at AAA rates. This has raised concerns about the possibility of converting B-rated papers into AAA-rated vehicles. The underlying explanation for this mysterious conversion points to the fact that there are numerous junior-class notes ranked lower than AAA. In actuality, there exists at least one class paper, referred to as the equity note that has not been ranked. Proceeds from mortgages are rewarded according to the seniority of the tranches on the tranche ladder; that is, from the most senior tranche to the most junior one. As a result, if defaults occur, the most junior tranche suffers the loss first, followed by the next junior and so forth. However, due to the substantial risks junior tranches bear, the interest rate paid to the most junior tranche is higher than that paid to the tranches high up on the ladder (Kim, 2008, p.49) as shown in figure 5.



**Figure 5. Interest, Principal, and Losses Priority**

### CDO Rating Models

The rating agencies depend on the CDO rating models in evaluating and appraising the potential financial risks of CDO tranches. Traditionally, CDO rating models were mainly employed for assessing CDOs for companies' debts. The first rating model, the binomial expansion technique (BET) developed by Moody's, was widely used to rate CDO portfolios, including those associated with sub-prime mortgages. This model produces the sum of defaulted loans in a portfolio with the rate of recurrence if loans of the security portfolio are more or less identical in probability of default (PD) and disclosure, and if defaults of loans are self-determining incidents. For instance, for a portfolio of 100 loans, the likelihood of only one loan default over the lifetime of the portfolio is very small. Likewise, the likelihood that 99 loans will default is very low. In actuality, the portfolios are heterogeneous in nature, hence the probability that many loans will default simultaneously is quite high (Kim, 2008, p.50).

The principal notion of BET is plotting the actual pool into a theoretically identical pool by computing the average probability of default of the disclosures and the diversity score. The diversity score wraps up the level at which the actual portfolio is identical. More significantly, it mirrors the default link between loans by restoring the sum of the loans in the portfolio. Using the above example, if the diversity score is 70, the rate of recurrence of the amount of defaulted loans is computed as if there are just 70 loans in the portfolio. The major elements of the computation are ratings or probability of defaults of the loans. The rating models used for corporate credits have proved efficient due to the fact that the credit value of companies is normally well studied and documented. However, when it comes to the subprime market, questions still linger as to whether these rating models could be adequately used to assess the default risks of the tranches.

### Ratings of Subprime CDO Tranches in CDO Rating Models

The mathematical nature of the rating models makes it difficult for actual and potential investors to evaluate the credit value of CDO deals. However, the models are useful as they enable the investors to make a point of reference to their investments. There are a number of reasons behind the ratings borne by CDO products. First, the three major rating agencies – Moody's, Fitch, Standard and Poor's – are Nationally Recognized Statistical Rating Organizations (NRSRO). As such, the agencies are permitted by federal and state laws to float their collateral portfolios in, among others, financial market funds and insurers. Subprime mortgages, unlike corporate bonds, lack secondary markets. To worsen the situation, rating agencies have very little expertise in the housing sector. Despite this, and the anticipation that the housing market boom would explode, rating agencies have continued to employ CDO rating models to assess subprime mortgages, using consumer credit scores (FICO) as a key. This strategy is problematic for the following reasons.

First, a rating model for subprime mortgages depends heavily on consumer credit scores at the time of inauguration. Single FICO scores are charted according to their credit past and some unique monetary characteristics.

Hence, they hardly ever vary until real defaults take place. The FICO scores are then plotted to the real rate at which defaults of subprime mortgages occur. Because these are predicted during an expansion of the housing market, the likelihood of defaults and default links among subprime mortgages is far lower than what would be anticipated during a slump in the housing market. This is the reason behind the enormous AAA portfolio of subprime mortgages (4/5).

A second reason why employing CDO rating models to assess subprime mortgages is problematic lies in the fact that a majority of credit-risk models have failed to effectively function during a traumatic duration. To worsen the situation, even pool diversifications have failed to improve the situation during such times since the new relationships may cause unforeseen concentration of risks. This event is referred to as a *correlation breakdown*, which is common in many investment markets. The lack of active sales of existing CDOs in secondary markets exacerbates the problem of subprime mortgages. Even if a market slump was anticipated by the rating agencies, the CDO rating models used would produce almost identical ratings for subprime CDO deals. Devoid of a pricing mechanism, the subprime market cannot regulate itself until it collapses (Kim, 2008, p.52).

### **Monoline Insurers and Residential Mortgage CDO Products**

Monoline insurance companies play a vital role in the structuring of CDO products associated with housing mortgages. These companies offer the credit security (wrap) to the senior-class tranches of CDOs. Because they do not provide credit security to classes that are lower than the senior-class, they attract investors to this class, thereby increasing its percentage. This adjustment can be achieved in two ways. First, notes of all tranches of a CDO deal can be reduced when a substantial credit risk for housing mortgages is anticipated. Secondly, the percentage of senior tranche notes in the CDO deal is increased in comparison to the remaining estimated sum of securities because a majority of the defaults is taken up by the junior tranches. Additionally, the rating is done according to the standard risk of the senior notes. To minimize the probability of incurring losses, monoline insurance companies may divide the senior class into two groups: a senior class and a first-loss class of the senior class. Despite this, the monoline companies have failed to avoid selling insurance to the latter group (Kim, 2008, p.53).

### **A Structural Model of Subprime Mortgages Based on Housing Market Risks**

A perfect CDO model for subprime mortgages should incorporate the following two features: an overt inherent price risk of single-family units and a method that illustrates how a fall in the housing price index would increase both the likelihood of default for sole subprime borrowers and the default relationship between subprime borrowers. Given the housing market price risks, the likelihood of default by subprime borrowers over the maturity period of their mortgages is equivalent to the likelihood of distance-to-default stabilized by housing market price instability. It is important to note that consumer credit scores are not used by the structural model to analyze the likelihood of mortgage defaults (Kim, 2008, p.54). To compute the financial risks of subprime CDO tranches, it is necessary to compute the probability of a portfolio loss. Of most convenience is the need to pin point one factor that can influence the prices in the housing market. This factor may subsume variations in the rates of mortgages. Kim (2008, p.54) said, "... housing market prices tend to move in the opposite direction of mortgage rate changes, and the severity of portfolio loss in general depends on the size of mortgage rate changes."

### **The Distribution of Portfolio Loss Rates**

The pool of subprime mortgages is coarse, a feature characteristic of consumer goods. This means that single mortgages are very minute in comparison to the volume of the pool, which may contain hundreds of mortgages. This suggests that the real pool loss can be directly estimated by the anticipated portfolio loss. The provisional portfolio loss relies heavily on the general factor of variations in mortgage rates. As a result, the distribution of the pool loss rates may be described as a growing normal distribution dependent on the variations in mortgage rates. Subprime mortgages can be divided into CDO classes which can be ranked without using the Monte Carlo simulations. CDO class ratings obtained from this approach are essentially dissimilar from the conventional rating models in two ways. First, the risks of the housing prices are overtly inherent in the model. Secondly, every CDO class is ranked according to the rigorousness of general-feature movements. Consequently, if the volume of defaults within subprime mortgages increased, it would be due to a universal decline in housing prices rather than to a correlation breakdown.

## Common CDO Risk Measures

Tranche Default Probability measure forms the foundation for rating agencies to allot a rating to a CDO class for a probability-based model. Main Factors influence risk analyses of different types of CDOs are listed in table 1.

**Table 1: Factors in Risk Analysis of CDO**

Factors in Risk Analysis of Cash and Market Value CDO		
	Cash CDO	Market Value CDO
1	The Outstanding Principal Amount	Over-Collateralization Ratio
2	Par Amount of the Underlying Collateral	Mark-to-Market Value
3	The Amount of the Actual Interest Collection	Heavily Influence by Market Situations

## Expected Tranche Loss

This measure is not only concerned about whether or not an individual tranche is faced with a loss, but also about the volume of the potential losses. This measure is especially used by Moody's rating agency to assign ratings to CDO tranches.

## Tranche Loss-Given-Default

This measure is calculated by dividing the expected tranche loss by the tranche default probability provided that the expected tranche loss and the tranche default probability are not correlated. The ideal assessment by rating agencies is made with a probabilistic notion of tranche losses and, as a result, is highly influenced by the postulations made in the internal credit pool model. Such postulations are ideally approximated from past ratings and default information. Thus, the likelihood and the anticipations taken into account are taken as a real or a past measure (Servigny and Jobst, 2007, p.298).

## Market Risks

The inception of any market vehicle is always accompanied by a premise that the members of the market will fail to comprehend the related risks. For instance, there is proof in the interest-rates swap market of companies supposedly failing to comprehend these risks. The same can be said about the collateralized debt obligations market. These tools have been crucial credit inventions, but there have been cases in which investors suffered from difficult financial challenges because the product was invented and introduced into the market before the public could be educated about it. Lucas, Goodman and Fabozzi (2009, p.12) stated, "...these instruments have been important financial innovations, but there were investors who experienced financial fiascos because product innovations may have run far ahead of product education." Where a financial establishment wishes to enter into a new credit risk transfer vehicles' market, the sale of more complicated goods, such as synthetic CDOs, may increase the establishment's risk of incurring losses and losing its position in the market. Additionally, there is the risk of modeling. For instance, in reference to single-tranche CDOs, an investor may obtain an unfair position in the market and thus may try to improve the position through delta hedging (Lucas, Goodman and Fabozzi, p.12). The risks in such a case would emerge if the investor fails to hedge accurately. As a result, there is a need for market investors to keep on enhancing their risk-management skills and for managers and regulators to keep on enhancing their comprehension of the related concerns (Jobst, 2006, p.55). Risk management, exposure and assessment are three most important issues that investors in the market need to take into account.

## Sensitivity measures

Sensitivity measures of a CDO deal are of four types: tranche sensitivity to variations in correlation, tranche sensitivity to wide variations in credit spreads, the subordination effect, and the standard deviation of losses.

## **Correlation sensitivity**

Correlation sensitivity measures the changes of the tranches as the correlation is adjusted. The most junior tranche (i.e., the equity tranche) has the longest correlation because its value rises as the correlation increases. On the other hand, the distribution declines with higher correlations. The explanation for this trend lies in the fact that “higher correlation increases the probability of fewer defaults as well as the probability of more defaults” (Hussain, 2007, p.20). Equity tranches are very sensitive to defaults because, in case of any default, they are the first to suffer the losses. As a result, equity tranches favor higher likelihoods of less default, thereby greater correlation. Contrary to the junior-class investors, Class A investors are characterized by short correlations. A greater correlation for this class translates into a reduction in the worthiness of the tranche and an increase in its distribution.

The tranches that fall in the middle of the CDO capital makeup will behave in a manner similar to that of either the equity tranche or the senior most tranches, depending on their sensitivity to the correlation postulations. For instance, Class C (6-9% tranche) demonstrates rigid sensitivity to variations in correlations outside the initial 25% correlation. On the other hand, the higher classes on the tranche ladder are vulnerable only to severe market disruptions that lead to higher market correlations and numerous defaults (Hussain, 2007, p.21). These observations demonstrate two essential characteristics of CDO deals. First, market participants having dissimilar correlation postulations will place different rates to an individual tranche, thereby generating a model risk and a chance for correlation or model arbitrage. The measurement of correlation is difficult to compute because it is vulnerable to prediction errors, personal bias and correlation collapses. Secondly, mezzanine tranches are the least susceptible to variations in the correlation measurement and modeling errors. For instance, Class C investors have recorded very few variations in the worthiness of their tranche even when the correlation multiplies. Investors who desire to reduce parameter risks will, for that reason, have a preference for the middle tranches of a CDO deal.

## **Sensitivity to Broad-Spread Changes**

In illustrating the impact of changes in broad spreads on CDO tranches, the tranche fair spreads are usually computed following an increase in the credit distributions. The decline in the tranche’s mark-to-market value should also be computed. The results of these computations may show that the spread on the most junior tranche is least vulnerable to pronounced variations in credit spreads. On the other hand, an equity tranche may record the greatest hypothetical mark-to-market (MtM) variations as a fraction of the tranche.

In contrary, the spread on the top-most tranche should be most vulnerable to wide variations in credit spreads, even though its MtM is least affected. These trends are anticipated because an increase in credit spreads puts an upward pressure on the possibility of a greater volume of credit defaults to which the top-most classes are more vulnerable. What this implies is that, in a market situation in which the value of credit is constantly falling, the likelihood of numerous credit defaults rises. This heightened likelihood, in turn, reduces the credit subordination for the top-most tranches while raising the possibility of credit losses affecting the top-class tranches. It is worthwhile to note that it is impossible to distinguish the impact of a wide increase on default likelihood across credits from the impact of a rise in the default correlation across the same credits (Hussain, 2007, p.22).

## **The Subordination Effect**

The anticipated loss of a tranche is subject mainly to the credit spreads of the underlying assets as well as the credit improvement offered to the tranche. The subordination changes with variations in the average spread on the underlying portfolio. As the quality of the underlying portfolio is reduced, greater rates of subordination are required to preserve the anticipated loss of junior classes at a level comparable to its base level. This assessment demonstrates another feature of CDO structure: virtually any sought-after rating can be achieved for a tranche if the accurate level of credit improvement can be made available to that tranche. Hussain (2007, p.23) argued that, “the lower the credit quality of the reference portfolio, the more subordination the tranche will require to achieve the same rating.” A higher subordination also has a great impact on the leverage of any tranche. Leverage, on this occasion, refers to the anticipated loss of the tranche divided by the anticipated loss of the underlying pool. Higher subordination creates lower leverage, and vice versa. In short, the credit quality of the underlying pool is directly related to the leverage required by a tranche to attain its desired rating.

## **Standard Deviation and Unexpected Losses**

In CDO deals, standard deviation is employed to describe computations for unforeseen losses and requisite financial capitals used to cushion against severe losses. In this case, an unforeseen loss of a tranche is defined as “the loss level at one standard deviation above the expected loss of the tranche” (Hussain, 2007, p.24).

## **Asset-Backed Securitization**

One strategy of releasing regulatory capital is to offer collateralized debt obligations (CDOs) for project finance loans. As discussed earlier, CDOs entail collecting a pool of loans and securitizing the repayment duties. The ranked notes are then floated to investors. A principal goal of such transactions is to minimize the regulatory capital prerequisite of the related loans. Also influencing the current reputation of structured finance CDOs are (1) improved investor desire for disclosure to infrastructural sectors through issuance of bonds, and (2) the reality that CDOs provide investors with a variety of credit exposures and a competent diversification of risks. One other common characteristic of such transactions is their offering the instigating bank the ability to regain the credit risk for the loans upon the expiry of an agreed-upon time frame (Bliss and Harud, 2007, p.1).

As far as the rating process is concerned, the whole pool, along with single instruments, is rated. The ranking of the underlying portfolio involves an analysis of incidents that are related to a credit assessment. The rating also takes account of the risks of default correlations; that is, the likelihood that one loan default will influence the default of other loans as a result of loan congestion in the market. To this day, rating agencies have stuck to the belief that portfolios of PFI/PPP loans are somehow cushioned against correlations because each loan is strictly structured on a single project-specific foundation and, therefore, is insulated from the effect of broader financial activities (Bliss and Harud, 2007, p.2).

## **The Role of Technology in the CDO Market**

As with a majority of sectors in any economy, technology has an important role to play in the Collateralized Debt Obligations market. Indeed, a question that lingers in the minds of many in the midst of the current financial crisis is one about the prospect of CDOs and other, similar, markets. The CDO market is presently seen as being on the verge of dying. The number of losses and write-downs that continue to be recorded is a clear indicator of the fragility of the CDO market. The only remaining options are to hold on to profit chances and to adopt effective risk-management mechanisms (DeBenedictus, 2008, p.98). Unlike in the past, however, players in this market will invest in a different manner. They will tread more cautiously in the market and will want a better comprehension of what exactly it is they are investing in than was the case in the past. This can only be achieved if more information delivered through advanced technological devices is offered to investors prior to making any investment.

The potential of implementing technology in the CDO market is, however, wrought with numerous challenges. The ability of investors to completely comprehend the makeup, constituents and risks involved in the CDO deals requires an overhaul of the structure and a proper documentation of information and data distributed to investors (DeBenedictus, 2008, p.99). Furthermore, new rules need to be made about the payments made in any given CDO deal. Addressing all these challenges and restoring the CDO market will necessitate the use of advanced technologies by both mortgage inventors and the providers of a secondary market. It will also require cooperation among the interested parties. DeBenedictus stated, “...originators, secondary market issuers, industry groups and rating agencies will see value in cooperative development of best practices and standards for what data elements are appropriate” (2007, p.101). These practices and standards will assist the market participants to obtain the much-needed data and to make the data available for investors.

## **CONCLUSION**

While collateralized debt obligations became part of the financial market in 1987, it is in the past decade that their popularity has grown tremendously. These vehicles refer to pools of loans, some of which are homogenous while others are heterogeneous in nature. The CDO market was hit hard by the current financial crisis both because of the risks

inherent in the portfolios and because of the failure of CDO managers to timely address such risks. All participants of the market-- lenders, borrowers, investors, federal regulators and rating agencies -- are held accountable for the collapsing market. However, the inefficient models used by the rating agencies bear the biggest share of the blame because they provided investors with inaccurate information regarding the performance of the collaterals. Today, risk management is considered an important aspect of the CDO market. Various risk-management tools are used to assess the credit risks of the underlying collateral portfolios. The CDO market can indeed stand up where it fell, only if advanced technologies are used to collect, manage and distribute accurate and timely information to all involved players. Only then can investors be able to make sound decisions concerning their actual and potential investments.

## REFERENCES

- Bliss, N., & Harud, V. (2007). The mother of invention. *International Financial Law Review*, p.1-5. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1230540611&sid=2&Fmt=3&clientId=13118&RQT=309&VName=PQD>
- Davenport, T. (2008). The crisis so far: A market restructured. *American Banker*, 173.78, 1-3. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1512806961&sid=2&Fmt=3&clientId=13118&RQT=309&VName=PQD>
- DeBenedictus, M. (2008). Technology's role in restoring the CDO market. *Mortgage Banking*, 69.3, 91-95. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1619016851&sid=1&Fmt=4&clientId=13118&RQT=309&VName=PQD>
- Goodman, L.S., Lucas, D.J., & Fabozzi, F.J. (2007). Financial innovations and the shaping of capital markets: the case of CDOs. *The Journal of Alternative Investments*, 10.1, 62-71. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1310806751&sid=2&Fmt=4&clientId=13118&RQT=309&VName=PQD>
- Hussain, J. (2007). Pricing and risk management of synthetic CDOs. *Journal of Structured Finance*, 12.4, 17-28. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1263559621&sid=2&Fmt=3&clientId=13118&RQT=309&VName=PQD>
- Jobst, A.A. (2006). European securitization: A GARCH model of secondary market spreads. *Journal of Structured Finance*, 12.1, 55-82. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1045273031&sid=2&Fmt=4&clientId=13118&RQT=309&VName=PQD>
- Johnson, L.D., & Neave, E.H. (2008). The subprime mortgage market: familiar lessons in a new context. *Management Research News*, 31.1, 12-18.
- Kim, Y. (2008). Subprime CDO ratings and the current financial crisis: A modeling perspective. *The RMA Journal*, 91.2, 48-53. Retrieved February 2, 2009, from <http://proquest.umi.com.ezproxy.apollolibrary.com/pqdweb?did=1592644371&sid=2&Fmt=3&clientId=13118&RQT=309&VName=PQD>
- Lucas, D.J., Goodman, L.S., & Fabozzi, F.J. (n.d). *Collateralized debt obligations and credit risk transfer*. Retrieved February 2, 2009, from [http://www.capco.com/files/pdf/64/02\\_MARKETS/04\\_Collateralized%20debt%20obligations%20and%20credit%20risk%20transfer.pdf](http://www.capco.com/files/pdf/64/02_MARKETS/04_Collateralized%20debt%20obligations%20and%20credit%20risk%20transfer.pdf)
- Morokoff, W.J. (2003). *Simulation methods for risk analysis of Collateralized Debt Obligations*. Retrieved February 2, 2009, from: <http://74.125.77.132/search?q=cache:InU3N2b-aGsJ:www.informs-sim.org/wsc03papers/041.pdf+risk+and+risk+management+for+collateralized+debt+obligations&hl=en&ct=clnk&cd=15&gl=ke>