

2 CDO: general characteristics

2.1 Introduction and definition

Securitization has started to play a huge role in the market of the structured products since the beginning of the 1990s, reaching significant levels in the last decade. The terms "securitization" refers to the transfer of an asset pool into tradable securities.

In the securitization environment, CDOs, as their market volume demonstrate, represent one of the most popular instruments.

CDOs are a class of asset backed securities (ABS) which are securities backed by a pool of assets. Once the basket of assets is securitized it is available to be traded and the aim of a CDO is to allow the *buy side* to reach risk-return profile, otherwise not available under regulation, and the *sell side* to discard their risk exposures¹.

In a CDO deal, assets exposed to credit risk exposure are pooled and sold to a juridical subject called the *special purpose vehicle* (SPV). The SPV invests in the diversified pool of assets financing the purchase via the issue of financial instruments called notes, which are sold to the market in different tranches. Tranches are classified according to their grade of seniority and to their different risk-return trade off. The seniority refers to the priority in both repayment of the principal and payment of the interest. Usually, the "senior tranche" has a rating between AAA and A and it is the one with the highest priority. The "mezzanina tranche", with a rating between BBB and B and the "equity tranche", follows. The latter, sometimes also called equity piece, is the one with the highest risk profile, being the first tranche absorbing all the possible losses, and for this reason is usually unrated. According to this procedure the losses on the asset side are transformed in losses on the tranches, and the tranches holders entirely absorb them. This process is also called "waterfall".

2.2 The tranches role

CDO is an operation of structured finance which recurs on the tranches use. Suppose the *sell side* holds a portfolio, constituted by a set of defaultable

¹ Cherubini et al. (2007) p. 203.

instruments of different firms and its aim is discarding the risk exposure coming from that pool. The *sell side*, assuming it cannot sell the entire portfolio, could cut off the risk exposure. One way is represented by buying a credit default swaps (CDS) on each name the instruments refers to. Another possibility, the one this work is based on, is represented by a CDO. That is, tranching the portfolio and selling the credit risk incorporated in the tranches.

Tranches are the main characteristic on which structured finance operations are based. Each tranche is characterized by a lower limit called attachment point (L) and an upper limit called detachment point (U). These express the percentage of the total portfolio loss covered by the tranches. Usually the equity tranche is characterized by $L = 0$ and $U > 0$. The detachment point for each tranche overlaps with the attachment point of the subsequent, in terms of seniority degree, tranche. An holder of a tranche with attachment points $[L, U]$ is responsible for the asset pool losses exceeding L up to U . In this way the holder of that tranche will not suffer any loss when the total portfolio losses are lower than L and he will not be liable for the part of losses greater than U .

The tranches holders, bearing the credit risk included on the backed asset, have to be compensated via a periodic premium along the life of the CDO. Obviously, the lower the tranche seniority degree, the higher the tranche premium. That is, the highest premium is due to the equity tranche, which in several CDO contracts also receive a further initial upfront.

2.3 Classification of CDOs

Given the continuous products innovation and the slight differences existing between them, it is common to classify a CDO according to:

- the main aim of the operation in terms of the economic purpose the CDO would like to reach. It is possible to distinguish between balance sheet CDO, where the originator want to transfer credit risk, and arbitrage CDO, issued to profit from the difference between the market prices of the asset pool and the price of the securitized products.
- the management of the collateral as a way to manage notes 'cash flow and interests. It is possible to distinguish between cash flow CDO and market value CDO.

- the structure of the operation. It is possible to distinguish between cash CDO and synthetic CDO.

Finally it is also possible classify the CDOs according to the main characteristics of the asset constituting the pool. According to this criteria it is possible to distinguish between:

- collateralized bonds obligations (CBO), where the collateral pool are represented by credit risky bonds issued by both public or private firms. The main aim of CBO has to be found in arbitrage spread opportunities;
- collateralized loan obligation (CLO), where the collateral pool is represented by banks loans. Banks are mainly motivated by regulatory arbitrage altogether with economic risk transfer motivations.

2.4 Reasons for the utilization of CDOs

In the research of the reasons for the utilization of securitized products is fundamental to distinguish between the reasons of the financial institutions and the reasons of the general investors.

The most important reasons driving the financial institution to use securitized products have to be found in the risk management and in the diversification.

Supposing a bank's loan portfolio has a notable concentration in a certain industry or region, then the bank could reduce such concentration by securitizing part of the portfolio or by investing in securitized products concentrated on opposite region or industry.

Another important reason for the financial institutions lies in the regulatory capital relief.

In particular, taking their commercial loans as asset to securitize the main bank's aim is shrinking the balance sheet or reducing the capital requirements.

According to Basel II model, the regulatory capital requirement a bank has to dispose is 8% of the Risk Weight Assets (RWA) of the reference. After the tranching of the pool of loans, the new bank regulatory requirement is providing the capital corresponding to the piece retained. That is, passing the 8% of the RWA to the amount of equity piece retained.

However, whilst by one side this allows banks to benefit in terms of liquidity and risk transfer, by the other, there are implied huge costs of securitization that have to be taken into consideration in the final decision.

However, from a financial institution's point of view, securitization presents also drawbacks. To begin with, the benefit coming from regulatory capital relief might be limited by the holding of a large part of the equity tranches, which implies an incomplete transfer of credit risk exposure. Furthermore, securitization might be expensive considering legal costs, technical costs and rating agencies costs.

From a general investor point of view, securitization allows investor to reach risk-return adapted to his profile. For example, CDO tranches with the same ratings of other credit derivatives or bonds, have higher return. Furthermore, the credit risk exposure of structured products allows investor to achieve a credit risk exposure otherwise unreachable in the market. For this reason, some investors as institutional investors are not allowed to invest in such typologies of products.

2.5 Typical cash flow CDO structure

In this section, a typical cash flow CDO is explained, as illustrated in **Figure 1**. Although several classifications have been reported, only the cash and synthetic CDO are analyzed in detail below.

At the origin of a CDO operation there is a pool of assets, which could be remotely as well as only recently purchased by the bank, just to be inserted in the CDO pool. The originator is usually the holder of the assets, which sells it to the SPV.

The latter, as the name suggests, is a company set-up especially for the notes issue and the assets purchasing. The main characteristic of the SPV is the bankruptcy remoteness, reached via a strict legal separation between SPV and the originator, aiming to avoid a default of the SPV on its obligations due to bankruptcy of the originator.

The SPV, being a company expressly set-up, has no money for funding the purchasing of the assets, which will be purchased once the vehicle issued notes. That is, the total notional of the issued securities covers the principal of the pool. The interest and the principal due to notes investor will be covered with the interest and principal of the assets of the pool. Given that the investor is subject to the asset cash flow, investor purchasing notes absorbs the risk of the pool. For this

reason tranching notes in different classes, according to different risk profile, is comprehensible.

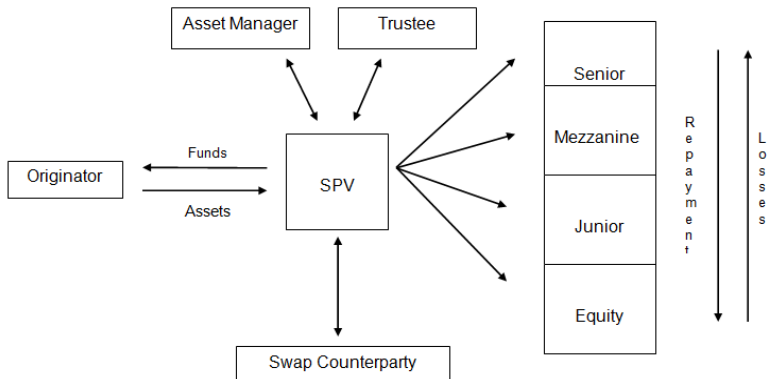


Figure 1: Typical cash flow CDO structure ²

Alongside these two main figures, other subjects play important roles.

The *sponsor* is a subject interested in the realization of the operation. Usually the sponsor is the subject underwriting the equity piece. In balance sheet CDO the sponsor is always a bank aiming for asset restructuring while in the arbitrage CDO the sponsor could be either a bank or an intermediary, whose aim is earning by the commission fee.

The *arranger*, usually an investment bank, is the subject responsible for the tranches placement to investors. Its earning is represented by commission fee.

The *asset manager* is the subject responsible for collateral managing. In arbitrage CDO, in contrast of balance sheet CDO, this role is certainly more important, given that the collateral can be actively managed.

The *trustee* is the subject responsible to collect, on behalf of SPV, the cash flow of the collateral in order to pay the notes' interest and commission fees.

² Bluhm, Overbeck and Wagner (2003) p.287.

2.6 Synthetic CDO

Synthetic CDO appeared in the market at the end of the 1990s and, in the last years, they have become very popular.

Differently from the cash CDO, where the assets of reference portfolio are sold to the SPV which purchase the ownership rights, in the synthetic CDO only the credit risk is transferred.

The reduction of legal issues, and their associated costs, altogether with the flexibility of the structure for arbitrage and hedging aims, made synthetic CDO very requested instruments.

Synthetic CDO, according to the funding methodology used, can be divided into *fully funded synthetic CDO*, *unfunded synthetic CDO* and *partially funded synthetic CDO*.

In a fully funded synthetic CDO, as in **Figure 2**, the originator, that is the protection buyer transfers to the SPV, that is the protection seller, the credit risk of a reference portfolio through a CDS. As a CDS contract implies, the SPV receives from the originator a premium for the protection he has to pay if credit event occurs. The protection seller issues notes for a value par to the reference portfolio, tranching them in different risk classes. Investors, once notes are underwritten, themselves become protection sellers. The amount collected by the issuing is then invested in a risk free collateral, whose interest is usually modified via a swap contract. The protection seller uses the interest generated by the default free collateral, together with the premium received by the protection buyer, both to respect the notes' holders rights and to ensure to the originator the protection agreed.

Differently from a fully funded synthetic CDO, in a unfunded synthetic CDO the originator transfers the reference portfolio stipulating more CDSs with the SPV. The CDSs differ for the risk they reflect. Furthermore, in this deal the investors are not supposed to response to any initial investments, so no notes are issued and consequently no risk free collateral is present.

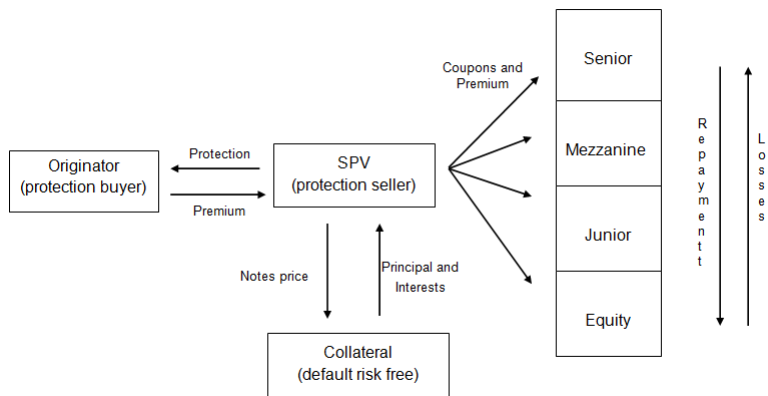


Figure 2: Fully funded synthetic CDO ³

A *partially funded synthetic CDO* is the most common structure of a synthetic CDO, which mix characteristics of a totally funded CDO and unfunded CDO. In this contract, as represented in **Figure 3**, the credit risk is transferred using both CDS and Credit Linked Notes (CLN). Usually the originator transfers the credit to two counterparties.

A first counterparty (protection seller) sells protection to the originator for a super senior and a junior tranches of the reference portfolio, through two different CDS. These two pieces constitutes the unfunded part.

A second counterparty, usually a SPV, sells protection to the originator for the remaining volume of the reference portfolio. As in a fully funded CDO, the SPV has to invest in a risk free collateral, to guarantee the payments due to the originator. If a credit event in the reference portfolio occurs, the SPV can cover the losses selling a part of its collateral securities. The collateral securities are bought, with the money which SPV collected issuing CLN. The notes linked to the reference portfolio, are divided in tranches reflecting different classes of risk and their interest are paid back with the spreads that the originator, as protection buyer, owes to the SPV.

In the occurrence of a credit event, the junior CDS counterparty is the first to cover the losses.

³ Bluhm, Overbeck and Wagner (2003).

When the cumulated losses of the reference portfolio exceed the upper limit of the junior piece, the notes' investors have to cover the losses according to the tranches seniority. Finally, when losses exceed the upper limit of the super senior tranches, the super senior CDS counterparty has to pay too.

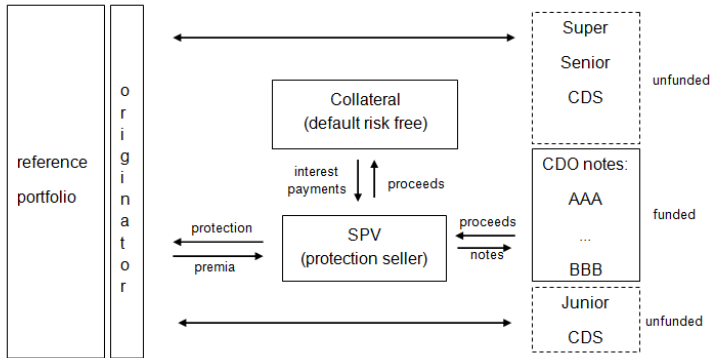


Figure 3: Partially funded synthetic CDO ⁴

2.7 Credit default swap index

2.7.1 Definition

Credit default swap index are tradable products that allow investors to sell or buy protection on specific credit markets, through establishment of long or short position on the index.

These indices are standardized and global products. The most important are: CDX indices in North America and Emerging Markets, and the iTraxx indices for Europe and Asia. A more clear overview of the global indices follows in **Figure 4**.

As well as an index, CDS indices reflect the performance of a basket of assets, which are in this case single CDSs. CDX and iTraxx are both characterized by a basket of 125 individual CDS with equal weights inside the portfolio. When a credit event occurs, the name is immediately removed from the reference portfolio.

⁴ Bluhm, Overbeck and Wagner (2003) p. 299.

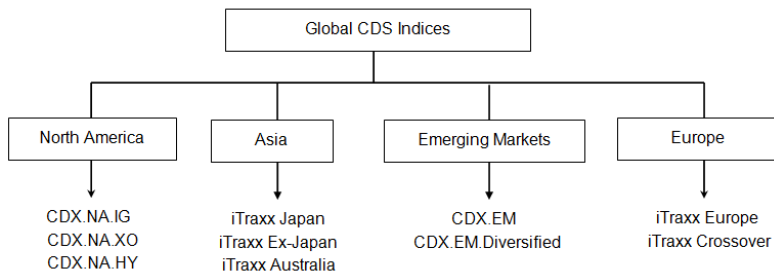


Figure 4: Overview of global CDS indices ⁵

Each CDX index acts as standard CDS with a fixed portfolio of credits and a fixed annual coupon, divided into quarterly payments.

These indices, such as each instruments traded in the market, have a price called the market spread, which is determined by supply and demand. For this reason, the difference between the fixed coupon and the current price, has to be offset via an upfront.

In particular, if the fixed coupon is greater than the market spread, then the protection seller (long position) has to compensate an upfront to the protection buyer (short position).

2.7.2 Synthetic CDS index tranches

A tranche allows division of the total risk of a reference portfolio into several classes, characterized by different risk-return profiles. The greater the risk an investor decides to bear, the greater its return compensation.

As a CDS provides credit risk protection on an individual name and as CDS index, provides credit risk protection on a reference portfolio of several individual CDSs, a *tranche* CDS index provides credit risk protection on a particular amount of loss, of a reference portfolio constituted by several individual CDSs.

⁵ Merrill Lynch (2006) p. 73.

A tranches is used to agree the specific pieces of the total losses, on which the protection is bought or sold. As in a CDS contract, the cost of the tranche protection is paid as coupon.

Standard tranches are traded on the North America CDS indices, CDX, and on the European CDS indices, iTraxx. **Figure 5** shows the tranches available.

Each traded tranchéd index differs according to its main characteristics.

For example, referring to the North America CDS indices market, CDX Investment Grade (CDX.IG) are divided into 0-3%, 3-7%, 7-10%, 10-15%, 15-30% and 30-100% tranches where the 0-3% class is called the equity tranches. Instead in the CDX High Yield (CDX.HY) the tranches are the 0-10%, 10-15%, 15-25%, 25-35%, 35-100% , where the 0-10% and 10-15% represent the equity. Another difference between these two index lies in the way equity is traded. In CDX.IG the equity premium is the sum of an upfront and a 500 basis point (bp) spread, while in CDX.HY equity premium is only the upfront. The equity tranche trades at the 500 bp in both indices.

In the European landscape the iTraxx, except for the tranches width, is similar to the CDX. The tranches are into 0-3%, 3-6%, 6-9%, 9-12%, 12-22% and 22-100% where the 0-3% is the equity tranche.

	USA		Europe
	CDX.IG	CDX.HY	iTraxx
Maturity	3y,5y,7y,10y	3y,5y,7y,10y	3y,5y,7y,10y
Tranches	0-3% 3-7% 7-10% 10-15% 15-30% 30-100%	0-10% 10-15% 15-25% 25-35% 35-100%	0-3% 3-6% 6-9% 9-12% 12-22% 22-100%

Source: JPMorgan

Figure 5: Summary of the available tranches index ⁶

2.7.3 Synthetic tranches target

The synthetics tranches are instruments which allow investors to receive default protection, leverage exposure, hedging and trading opportunities.

⁶ Source: JPMorgan (2006) p. 138.

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