

## D HAS THE EUROPEAN COLLATERALISED DEBT OBLIGATIONS MARKET MATURED?

*A market for collateralised debt obligations (CDOs) has evolved rapidly in Europe in recent years. Synthetically created CDOs based on credit default swaps have become a popular vehicle for transferring corporate-related credit risk from the banking sector to other parts of the financial system. As with other new markets, CDOs contribute to financial efficiency, but also present new risks that central banks need to understand. From a financial stability viewpoint, concerns have been expressed about mispricing and inadequacies in risk management, even by the most sophisticated market players, as well as excessive reliance on rating agencies. Furthermore, public authorities face challenges in tracking credit risk around the financial system. Innovation and improvements in market functioning have helped to mitigate some of these concerns. In particular, the evolution of credit indices has fostered standardisation and secondary market activity. However, challenges for financial stability remain, requiring an ongoing monitoring of market developments by central banks.*

### INTRODUCTION

A CDO is a debt security issued by a special purpose vehicle (SPV) and backed by a corporate loan or bond portfolio (“cash CDO”). A so-called synthetic CDO has similar features, but the underlying securities are credit default swaps (CDS) that have been repackaged into a reference portfolio.<sup>1</sup> Unlike asset-backed securities (ABS), CDOs are not backed by a large, granular and homogeneous pool of assets, but by a heterogeneous asset pool with relatively few underlying obligors.

Typically several classes (or “tranches”) of securities with different degrees of seniority in the event of bankruptcy are issued to investors, permitting the re-engineering of the risk/return profile of the underlying collateral pool into

multiple risk classes. The first-loss tranche – called “equity” – absorbs the risk of payment defaults or delays. The next, more senior, tranche – called “mezzanine” – will incur losses only if the equity tranche is exhausted. The senior tranche is protected in the same fashion by both the mezzanine and equity tranches. Through this credit-enhancing technique, the senior tranche can achieve a triple-A rating – as is indeed the case with 80% of the structured finance market in Europe.

CDOs can also help to mitigate asymmetric information problems that are present in single-name credit risk transfer markets, thus helping to overcome market imperfections.<sup>2</sup> The originator of a corporate debt instrument may have private information about the quality of the debtor or a greater ability to value the debtor than an investor. As investors are aware of this, they will either require a premium to purchase a single-name exposure, or the market may not even exist. The diversification of credit risk in a portfolio makes risk-return profiles less sensitive to the performance of individual names.

By separating the origination and funding of credit from the allocation of the credit risk, CDOs facilitate a broader dispersion of risk which can, depending on where exposures become concentrated, enhance financial stability. Wider access to credit risk exposure enables banks to reduce their vulnerability to idiosyncratic or industry-specific credit risk shocks, for instance. Furthermore, the supply of credit can be less dependent on conditions

1 Synthetic CDO tranches can be either funded or unfunded. If a tranche is funded, the CDO investor pays the notional amount of the tranche when the deal is initiated, and any defaults on the underlying reference portfolio will lead to a write-down of the principal. In the case of an unfunded tranche, payments are not made upfront. The investor receives a spread and pays when defaults in the underlying asset portfolio affect the investor's tranche.

2 See the Committee on the Global Financial System (CGFS) Report (2004), “Role of Ratings in Structured Finance”, BIS, for a description of the economics of structured finance. However, it should be noted that asymmetric information is still of concern in actively managed CDO transactions where the arranger or CDO manager has the right to substitute underlying credits during the life of the CDO.

affecting banks' ability or willingness to take on credit risk, possibly making bank-driven credit crunches less likely as the market grows.

As with other innovative financial markets, CDOs can entail new risks that central banks need to understand. To the extent that central banks may accept these instruments as collateral in their credit operations, they may even be directly exposed to them. From a financial stability viewpoint, concerns have been expressed by many market observers concerning mispricing, inadequacies in risk management, excessive reliance on rating agencies, and regarding the challenges CDOs create for public authorities in tracking credit risk around the financial system owing to the opacity of the market.<sup>3</sup> Nevertheless, innovation and improvements in the functioning of CDO markets described in this special feature have served to mitigate some of these concerns.

### THE MARKET FOR CDOs IN EUROPE

A market for CDOs has evolved rapidly in Europe. Synthetically created CDOs based on CDS have become a particularly popular vehicle for transferring corporate-related credit risk – bundled into portfolios – from the banking sector to other parts of the financial system including the insurance sector, as well as pension and investment funds.

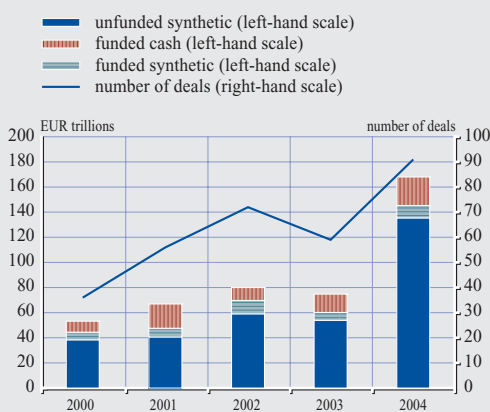
The European CDO market is essentially synthetic, as the corporate bond market is still in its infancy, and obstacles remain to the cross-border transfer of bank loans (see Box D.1). Synthetically created portfolios based on credit risk derivatives are not bound by the availability of cash-settled corporate debt instruments, and can remain on the balance sheet of risk shedders. Corporate bonds and loans also lack liquidity, making it costly for credit investors to assemble a portfolio matching their diversification and risk-return targets. A synthetic portfolio allows investors to economise significantly on transaction

costs, since liquidity in the CDS market tends to be much deeper than in those for underlying cash instruments.

Measuring the size of the synthetic CDO market in Europe is fraught with challenges. A large part of the market consists of private, highly customised transactions for which information is limited in the public domain. Estimates based on publicly placed deals are therefore likely to significantly underestimate CDO issuance volumes. According to Merrill Lynch, public CDO issuance amounted to almost EUR 180 billion in 2004 (see Chart D.1).<sup>4</sup> Participants estimate that private issuance could be of a similar magnitude.<sup>5</sup>

Chart D.1 Total European CDO issuance

(2000 - 2004)



Source: Merrill Lynch.

3 Both the Joint Forum Report (2004), "Credit Risk Transfer", and the CGFS Report (2004), op. cit., were inter alia motivated by these concerns.

4 See Merrill Lynch (2005), "Global Cash Flow CDOs and Their Assets", February.

5 This would be consistent with the findings of Fitch Ratings (2004), "Global Credit Derivatives Survey", September. This survey found that total gross protection sold (publicly and privately) via cash and synthetic CDOs amounted to roughly €300 billion in Europe in mid-2004.

## EVOLUTION OF THE EUROPEAN CDO MARKET

On the basis of a number of special reports issued by rating agencies and interviews conducted in the context of the CGFS Working Group on the role of ratings in structured finance with rating agencies, arrangers of CDO transactions and investors in the course of 2004, this box describes the main developments in the rapidly-evolving CDO market.

The European CDO market took off with the advent of credit risk derivatives in the late 1990s. Driven by regulatory capital arbitrage of loan-originating banks, synthetically created collateralised loan obligations (CLO) dominated early deals. However, after 2000 the goal of synthetic transactions gradually moved away from balance sheet management to arbitrage CDOs, driven by a desire to exploit arbitrage opportunities between higher yielding assets and lower interest-bearing liabilities.

The first generation of synthetic CDOs was subject to heavy rating downgrades in 2001 and 2002 as the corporate sector was confronted with financial strain. The downgrading was typically attributed to adverse selection in the initial portfolio selection by the sponsoring institution. Responding to the underperformance of the early deals, a two tier market subsequently evolved:

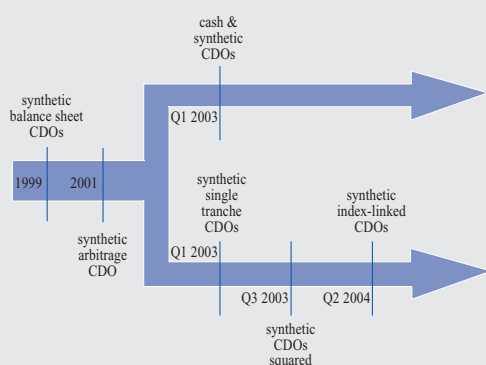
A *public market*, increasingly standardised and generally backed by large granular portfolios, resembling traditional ABS portfolios. The revival of CLOs backed by SME loans was indicative of this market trend. An important feature of this market segment is that it continues to be rated, and investors tend to be less sophisticated. Senior note investors, which represent the bulk of investors, in particular tend to rely on rating agencies for risk assessment and pricing, while only investors further down the capital structure seem to perform their own due diligence.

A *highly customised, bilateral market*, in which portfolios continue to be highly concentrated and for which correlation modelling therefore remains essential. This market segment for correlation-intensive CDOs has gone private in that issues are directly placed with investors. This poses challenges for tracking the size of this market segment and for monitoring market developments. According to rating agencies and the large investment banks that arrange CDOs, investors in this market tend to be more sophisticated, and rating agencies play a less crucial role than previously assumed.<sup>1</sup> Regarding the modelling of correlations, in particular, rating agencies have not been standard-setters. Dealers of correlation-intensive products claim to be ahead of rating agencies, which admit to having problems in keeping up with cutting-edge correlation modelling techniques. Overall, it seems that ratings are increasingly used as a benchmark for comparison, but not substituting investors' own risk analysis.

One of the most important recent product innovations in the latter market segment has been the single-tranche CDOs, which, according to rating agencies became the dominant CDO product in 2004. In a single-tranche CDO, the arranger only sells one tranche to one investor. The size

<sup>1</sup> See the findings of CGFS (2004), op. cit., based on interviews with rating agencies, arrangers and investors.

Figure D.1.1 Evolution of the European CDO market



Source: ECB.

of this tranche is designed to match exactly the risk appetite and credit expertise of an individual investor. Single-tranche CDOs have allowed more sophisticated investors to alleviate the conflicts of interests that were present in earlier deals, by giving them greater control over the characteristics of the transaction, enabling them to select some or all of the underlying credit. Moreover, they are easier to restructure in the wake of a credit event. Only one investor's approval is needed to inject additional equity into a deal and thereby to maintain its rating.

The advantage of single-tranche CDOs for arrangers/dealers is that investors must not be found for all tranches across the entire capital structure in order to execute a transaction. However, single-tranche CDOs create new hedging requirements: whereas in a traditional arbitrage CDO the dealer's position is fully hedged (i.e. the same amount of credit is sourced in the market as is transferred to CDO investors), in a single-tranche CDO a dealer is unable to hedge the position perfectly by engaging in an offsetting transaction. Instead, the dealer needs to sell protection on each of the underlying credits via CDS according to the "delta" – a measurement of the amount of protection that needs to be sold on each name to hedge the market-to-market on the overall single-tranche position caused by spread movements in that particular name – of each credit. These amounts change as the level of credit spreads changes, which means that single-tranche CDOs require dynamic hedging.

Such hedging activities have created strong linkages between the single-name CDS and the synthetic CDO market. In fact, the market for correlation products has evolved to encompass two dimensions: portfolio credit risk transfers executed via single-tranche CDOs (and related products) from the arranger to the investor, and the CDS executed by the arranger in the market to hedge outstanding risks stemming from those transactions. Since the former instruments are highly leveraged, hedging needs are a multiple of the notional outstanding amounts of single-tranche CDOs.

#### FINANCIAL STABILITY CONCERNS ARISING FROM THE PRIVATE CDO SEGMENT

After investors were faced with downgrades and losses in 2001 and 2002, arrangers together with rating agencies developed in the public CDO segment a strand of CDOs backed by highly diversified portfolios that more closely resemble traditional ABS, and that can rely on established rating methodologies. Moreover, structural enhancements and tighter covenants for actively managed CDOs have helped to

mitigate some of the moral hazard and adverse selection problems present in the earlier deals. However, while pricing and model risks have declined in the public CDO market, they remain present in the private CDO segment, which continues to be dominated by highly correlation-intensive products.<sup>6</sup>

<sup>6</sup> Both the Joint Forum Report (2004), op. cit., and the CGFS Report (2004) stress model and liquidity risk inherent in single-tranche CDOs and related hedging activities.

The degree of portfolio diversification is a crucial determinant for the shape of the loss distribution of a heterogeneous portfolio of underlying credit exposures. While the probability distribution of an uncorrelated portfolio's potential losses is generally centred on the expected loss, a highly correlated portfolio may exhibit thick tails, so that the probability of severe losses (or significant gains) can be very high. As a consequence, the higher a portfolio's correlation, the higher the risk of the senior tranche becomes: either no asset in the portfolio defaults and all tranches, including the equity tranche, remain free of losses, or all assets default and all tranches suffer a loss. Accordingly, accurate estimation of default correlations is essential for precision in the pricing of different tranches.

However, a key problem is the scarcity of empirical data on default correlation. As a result, when investors price these transactions and when the arrangers/dealers that have put them together hedge their outstanding positions, they are exposed to the risk that their correlation assumptions could prove to be imprecise ("model risk").

In addition, when dynamic hedging techniques are required, as in the case of single-tranche CDOs, arrangers/dealers are exposed to liquidity risk (see Box D.1). Successful hedging of the outstanding risk on a single tranche sold to investors requires a liquid CDS market for the underlying reference entities. To the extent that the latter may not have sufficient liquidity for dealers to adjust hedges as desired, without incurring high trading costs, hedges may remain incomplete. Whether the European CDS and corporate bond markets provide as yet enough liquidity to absorb the substantial increase in hedging transactions created by the explosive growth of the single-tranche CDO market remains to be seen. In a deteriorating credit environment when dealers would have to rebalance their hedges on a large scale due to the highly leveraged nature of single-tranche CDOs, liquidity in the CDS market could start to dry up. A substantive widening of spreads in

the CDS market may feed back to underlying cash markets such as the corporate bond and syndicated loan market creating adverse market dynamics. Hence, while under current market conditions the extended linkages between CDS and underlying cash markets created by synthetic CDOs has reinforced the tightening of credit spreads in the corporate bond market, it may amplify credit spread widening in times of market stress and create a channel for contagion.

#### **IMPROVED MARKET FUNCTIONING THROUGH THE EVOLUTION OF CREDIT INDICES?**

A recent market innovation that has fostered the trading of credit risk correlations is that of CDS indices. CDS indices are tradable portfolios consisting of the most liquid single-name CDS. They allow market participants to express relative views on the credit markets by region or sector in a cost-efficient manner, and can be an important tool for the hedging of credit exposures within loan and bond portfolios.

The roll-out of a single set of global CDS indices – iTraxx – in mid-2004 was a catalyst for the trading of single-tranche CDOs in both Europe and the US (See Box D.2). Because of the liquidity the indices provide, CDS index tranches – synthetic CDO tranches based on the iTraxx index – have started to develop in Europe. Compared to the highly customised single-tranche CDOs, such products are standardised. This has facilitated the development of a liquid secondary market for CDS index tranches. It has also made pricing more transparent, since CDS indices provide a market estimation of default correlation. As a consequence, investor participation has already started to broaden. Hedge funds that had previously concentrated on single CDS and avoided portfolio credit derivatives due to high pricing and liquidity risk are now entering the market. Insurers, pension funds and other institutional investors have also started to trade iTraxx tranches and other second generation derivatives.

## Box D.2

## TRADABLE CDS INDICES AND THE FUTURE EVOLUTION OF CREDIT AS AN ASSET CLASS

On 21 June 2004 the leading market makers in credit risk derivatives agreed to merge two competing indices, Dow Jones' TRAC-X and iBoxx, into one index family – iTraxx in Europe and Asia and CDX in North America.<sup>1</sup> A CDS index contract is an insurance contract covering default risk on the pool of names in the index. Liquidity is enhanced by including only the most liquid single-name CDS in the indices and by market-making activities. In Europe, iTraxx brings together 27 market makers. It is composed of several benchmark indices for investment-grade and non-investment-grade credits, and numerous sector indices that are transparent, rules-based and administered by a jointly owned private company (the International Index Company).

The formation of a single index family has allowed market participants to focus all trading on one index for each region, each sector and for various maturities. This has considerably boosted liquidity. Bid-offer spreads in the market have dropped from 5/10 basis points across the preceding indices to half a basis point across the main five-year iTraxx Europe index. Leading market makers in Europe foresee a further tightening of spreads in line with patterns seen in the US credit default swap index ("CDX index"). Moreover, for each market it represents, the CDX index has become the single most liquid instrument in that credit market.

iTraxx has promoted transparency for market participants, since bid-offer spreads are quoted on a daily basis and made available online to non-bank investors as well. This provides non-bank investors with a reference market-based price that was previously unavailable. Indices also facilitate the exploitation of arbitrage possibilities between the index and its individual components, thereby enhancing the price discovery process. Moreover, they can also provide market-based model inputs, including various implied correlations. In this way, they further facilitate the movement from model-based to market-based pricing. In parallel to International Swaps and Derivatives Association (ISDA) initiatives for promoting industry credit derivatives standards, the iTraxx consortium of market makers has also been active in promoting the standardisation of CDS indices and second-generation index products. It has recently also facilitated the adoption of market standards for the selection of reference obligations, with a view to ensuring that illiquid names are replaced by more liquid ones. These market-led initiatives are reducing legal and operational risks, thereby enhancing liquidity.

Until recently, a two-way market in high-yield CDS had been developing only slowly, and the low level of liquidity of these credits impeded their inclusion in single-tranche CDO portfolios. The establishment of one widely traded high-yield index, iTraxx crossover, has expanded the universe of frequently traded corporate names in the CDS market to the high-yield sector. This has boosted liquidity in the high-yield single-name CDS market in Europe.

There are indications that the introduction of credit indices is fostering more liquid and transparent markets for credit risk generally. Credit indices seem to be increasingly used to price new corporate bond issues and may become the crucial benchmark for borrowers, thereby possibly also impacting the functioning of underlying cash credit markets.

<sup>1</sup> See ABN AMRO, Deutsche Bank, JP Morgan and iTraxx indices (2005), "The 2005 Guide to Tradable Credit Derivatives Indices".

Enhanced secondary market liquidity may foster credit risk transfer outside the banking sector.<sup>7</sup> While insurers and other institutional investors often only acquired senior tranches, risk-shedding banks retained the riskiest first-loss tranche. In addition, because the high-yield credit derivatives market has been slow to develop, investment-grade names have remained predominant in underlying asset portfolios. Increased position-taking by institutional investors in equity CDS index tranches may, however, build up momentum. There are also indications that high-yield credit indices have begun to boost liquidity in the high-yield single-name market. This may facilitate the inclusion of high-yield reference entities in single-tranche CDOs, thereby further enhancing the scope for larger cross-sectoral credit risk transfer.

However, the trend towards more standardisation of single-tranche CDOs has gone hand in hand with an opposite trend: driven by the strength of investors' appetite for yield-enhancing strategies in the current low-yield environment, the innovation cycle has substantially shortened. Arrangers and dealers are expanding the range of asset classes to ever more exotic assets (such as private equity, project finance, distressed debt, etc.). They continue to develop innovative, complex products for which correlation modelling techniques are still in their infancy. "CDO squared", or "CDOs of CDOs", are only one of the more recent market innovations.<sup>8</sup> Therefore, model risk and risks of mispricing remain high and it cannot be ruled out that investors or even arrangers may lack the analytical capacity to understand fully the risks embodied by these new complex products. Moreover, a number of market participants have expressed concern that there is not enough price differentiation in the current tight spread environment, and that neither CDO managers nor investors carry out enough credit work when putting new deals together.

## CONCLUDING REMARKS

The smooth functioning of the CDO market is important for an efficient allocation of risks within and outside the banking sector. In Europe it is clearly too early to say that the CDO market has matured. Market forces seem to be pushing in two opposite directions. On the one hand, the evolution of CDS index tranches has fostered standardisation of CDOs and facilitated active trading, thereby enhancing pricing and hedging capabilities and increasing the scope for cross-sectoral credit risk transfer. On the other hand, there is a tendency to introduce ever more complex products, driven by a continuous hunt for yield. It is difficult to assess to what extent investors and even arrangers have the analytical capacities to price and manage the risk of these transactions adequately. Given the pace of innovation and the ever wider participation of financial intermediaries in structured product markets, it is becoming increasingly important to map the nature and gauge the stability of such markets. Moreover, since the rapid growth of the CDO market and resulting hedging needs have increased the linkages between credit risk transfer instruments and other financial markets, central banks need to monitor market dynamics and assess their functioning in as yet untested stress conditions. Since effective monitoring is still hindered by the private nature of a large part of the market, efforts to improve information on credit risk transfer activities need to be strengthened.

<sup>7</sup> See ECB (2004), "Credit Risk Transfer by EU Banks: Activities, Risks and Risk Management", and Standard & Poor's (2003), "Demystifying Banks' Use of Credit Derivatives".

<sup>8</sup> In the European context, CDO squared are a repackaging of single-tranche CDOs that have been specifically created for the purpose of the transaction. The performance of CDO squared is ultimately derived from the performance of the combined pools of CDS underlying the single-tranche CDOs. CDO squared effectively allow investors to take "the cliff risk", i.e. no losses up to a certain point (typically in about 90% of the cases), after which the loss deterioration is very fast. To compensate investors for this "cliff effect", CDO squared offer investors higher yield.