

## UNDERSTANDING CREDIT DERIVATIVES

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## Understanding credit derivatives

Last months' liquidity and credit crisis reinforced the importance of credit derivative products in the dynamics of financial systems. Credit derivatives in particular, and securitisation in general, have substantially changed the shape of the liquidity and credit transmission channels in the economy.

Familiarity with the mechanics of these financial instruments is a requirement for market participants and financial regulators. The interaction of credit derivative products with the real economy, and their impact on economic policy measures, are also key for understanding the new financial architecture. In the first section of this paper we analyse the credit derivatives market and the mechanics of the most traded products.

Never before has the economy been so reliant on liquidity and access to credit. Securitisation compounded the impact of a lax monetary policy by providing the economy with unparalleled borrowing power. Through a reinforcing process of improving economic fundamentals, low interest rates, bank lending, risk outsourcing, securitisation and synthetic credit issuance, credit spreads continuously compressed since 2003 to historical levels.

The outbreak of the first signs of weaknesses in the economy during 2007 represented an abrupt end to the dynamics which channeled the liquidity from investors to firms and consumers. We review the main phases of the credit and liquidity crisis.

Together with the general economy and the rest of the financial markets, credit derivatives will have to adapt to the new transitory environment of lower liquidity and tighter credit conditions. There will be changes: new products, new participants, new dynamics.

At the same time, monetary policy will have to take into account the pro-cyclical effects of securitisation on corporate financing costs, which have stimulated positive economic periods, as well as accelerated the fall into the current recession. The implementation of Basel II may bring an added layer of pro-cyclicality to the banking system.

Credit derivatives contributed to boost the previous expansionary economic phase; they can also help market participants to weather the impact of the next one.

### 1 Credit Derivatives Explained

Credit derivatives are financial instruments with payoffs tied to the performance of an underlying *credit product*. The array of products which can serve as underlying for credit derivatives is extensive. On the corporate side we can think of bonds, loans... On the consumer side we can think of mortgages, consumer loans, credit cards... Thus, a first classification of credit derivative products refers to the nature of underlying instruments; in what follows, though, we shall mainly focus on *corporate based credit derivatives*. Being credit instruments themselves, *credit derivatives can be used as underlying for other credit derivatives*.

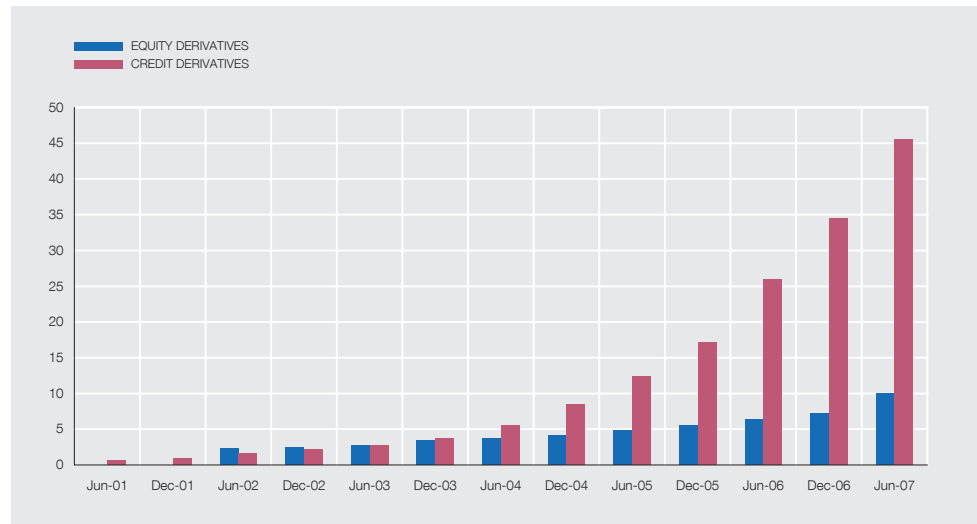
Since 2001, the credit derivatives market has grown at annual rates ranging from 75% to 150%. According to the latest ISDA<sup>1</sup> survey, the notional outstanding of the market is above 45 trillion USD (Chart 1).<sup>2</sup>

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1. International Swaps and Derivatives Association. 2. The over-the-counter nature of the credit derivatives market implies its size is difficult to estimate. Several international organizations (ISDA, BBA, BIS) conduct periodic surveys among market participants. The June 2007 survey of BIS estimates the total volume of credit derivatives contracts outstanding to be above 51 trillion USD.

## CREDIT VS. EQUITY DERIVATIVES: MARKET SIZE

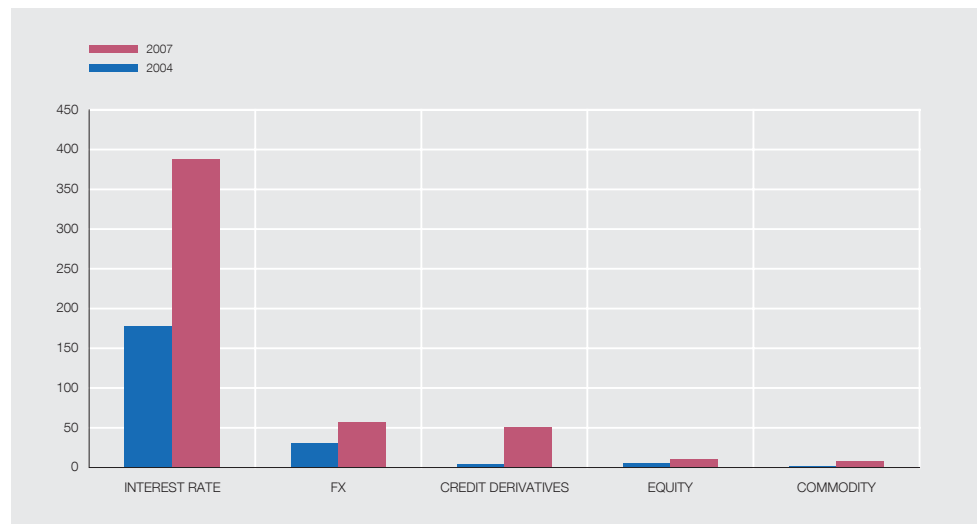
CHART 1



SOURCE: ISDA, BIS. USD trillion.

## SIZE OF DERIVATIVES MARKETS

CHART 2



SOURCE: ISDA, BIS. USD trillion.

The credit derivatives market is currently of a similar size to the foreign exchange derivatives market and almost five times the size of the equity derivatives market (Chart 2).

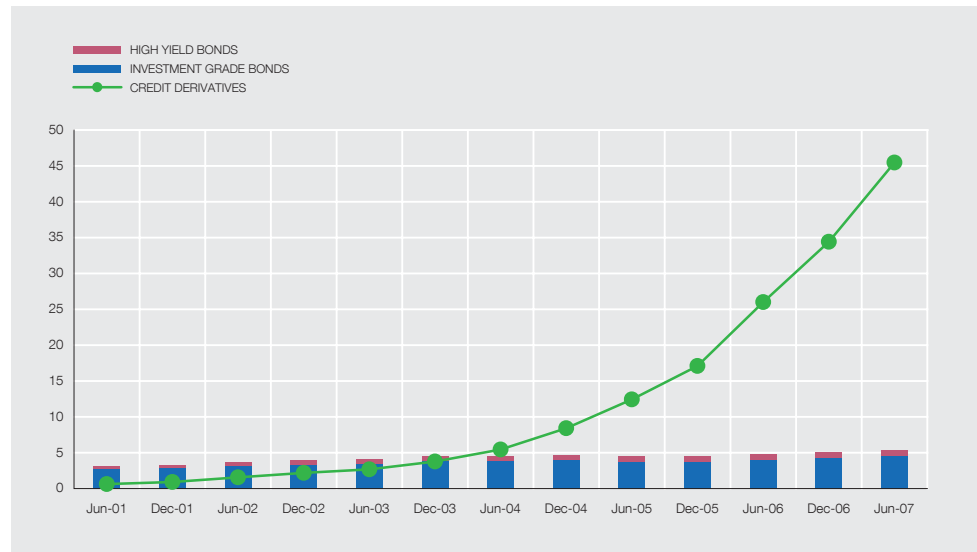
The exponential growth of the market exceeded the growth of the underlying corporate credit market (Chart 3), now many times smaller in size.

Underlying credit products (e.g. bonds) are contracts between two parties: borrowers and lenders. Similarly, credit derivative contracts are financial agreements between two parties: (credit) *protection buyers* and (credit) *protection sellers*. The risks and rewards of protection sellers/buyers are generally aligned to those of the lenders/borrowers in the underlying credit instruments: protection sellers receive a fee for taking the risk of a future loss triggered by an event related to the credit quality of the underlying company or reference entity.<sup>3</sup> Thus, in general, protection sellers benefit if the credit quality of the underlying reference entity improves

3. E.g. default by the reference entity on certain of its financial obligations.

CREDIT DERIVATIVES VS. BOND MARKET

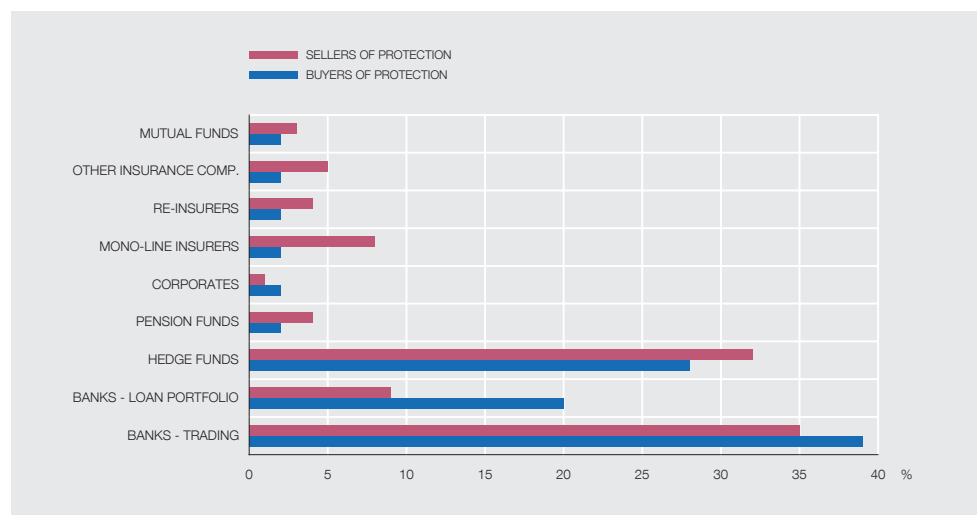
CHART 3



SOURCE: ISDA, Bloomberg. USD trillion.

CREDIT DERIVATIVES MARKET PLAYERS

CHART 4

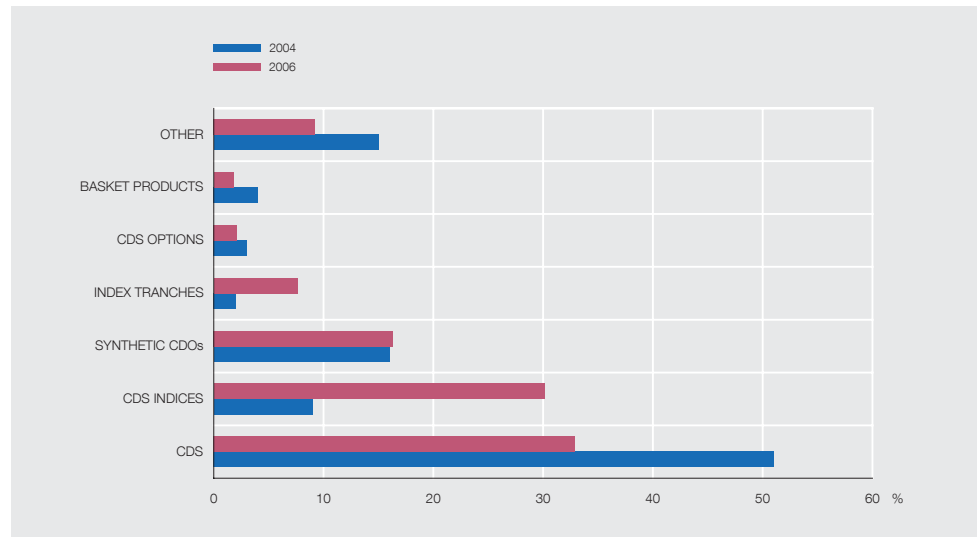


SOURCE: BBA. 2006 Credit Derivatives Survey.

(like the lender in the original transaction); any gain/loss for the protection seller is a loss/gain for the protection buyer, who would benefit if the credit quality of the underlying reference entity (or entities) deteriorates.

According to the 2006 BBA<sup>4</sup> survey, banks and hedge funds represented the bulk of the participants in the credit derivative market. Chart 4 shows the share of each player in the market. As existing and new investor groups become more involved with the products, the market share of banks and hedge funds will likely diminish. Though net protection sellers, hedge fund positions are evenly distributed between the two sides of the credit derivatives contracts. Pension funds, mutual funds and insurance-related companies tend to be net protection sellers, i.e. they obtain a yield for exposing a notional amount to a potential loss.<sup>5</sup>

4. British Bankers' Association. 5. For further details on market participants see also Rule (2001).



SOURCE: BBA. 2006 Credit Derivatives Survey.

Any primary or underlying financial instrument has an economic rationale and a string of risks derived from it. For example, both in the case of equity and credit products, the *economic rationale* is to transfer resources from shareholders and lenders to companies (borrowers) in order to finance corporate projects. The string of *risks associated* with each product comes from the probability of the financed company's projects being unsuccessful which, in turn, determines the probability of the shareholder or lender receiving money back. Those risks affect the price of the financial instrument in the secondary market.

A derivative product is able to isolate the risks from the economic rationale of the underlying product: their payoffs are linked to the risks (i.e. performance) of the underlying instrument, without the need to lend any money to the reference company. While the *underlying credit instruments are funded* (i.e. the investor has to physically lend money to the firm) *credit derivatives are generally unfunded* (i.e. the investor is exposed to the same, or different, risks without any initial investment). Thus, credit derivatives offer *synthetic exposure to the risks of traditional credit instruments*.

One of the key advantages of the credit derivatives market is its ability to combine efficiently the advantages of over the counter (OTC) and exchange traded markets:

- Even though it is not an exchange traded market and there is not a central clearing house, the credit derivatives market has been able to develop a *high level of standardisation on the products which act as building blocks for the market*, e.g. Credit Default Swaps (CDS) and CDS Indices. The efforts of the investor and dealer communities, together with ISDA, to put forward standard documentation for the different contracts have homogenised and enormously facilitated their liquidity and trading.
- Being an OTC market, the credit derivatives market is able to offer a *high level of flexibility* when designing new products (generally based on the existing and liquid ones) *to suit the specific needs of each participant*. This customisation has boosted the innovation in the market.

Key elements of each credit derivative product are its underlying instrument(s) and reference entity (or entities), the payoffs of each party and its main risk factors.<sup>6</sup> Our objective in the rest of this section is to present a taste of the possibilities and alternatives that the market offers.

## 1.1 BOND CREDIT DEFAULT SWAPS (CDS)

The most liquid and widely used credit derivative product, CDS represent more than 30% of the market and, at the same time, serve as the building block for many other products.

- Underlying credit instrument:
  - Unsecured debt (senior or subordinated) of a single (reference) company.
- Payoffs:
  - Protection buyer pays an annual fee until maturity of the contract or default of the reference company, whichever first.
  - Protection seller pays losses in case of default of the reference company, if any, at the time of default.

The contracted payoffs of a protection seller approximate the payoffs of a traditional bondholder. A key difference between the two is the *unfunded nature of the CDS contract*: while the bondholder has to physically lend the money to the reference company on day one, the protection seller does not. In case of default, the protection seller would have to pay the losses, while the bondholder would receive the notional minus the losses due to default.<sup>7</sup> Selling protection through a CDS could be seen as equivalent to borrowing money (at LIBOR) and using it to buy a bond.

Shorting the credit risk of a company with bonds would require the investor borrowing those bonds and selling them straight away. CDS allow investors to efficiently short the credit risk of a company by buying credit protection.

- Main risk factors:
  - Default probabilities.
  - Loss in case of default.

The market offers several variations of the standard CDS contract, letting investors take exposure to either of the above risk factors in isolation. Thus, through the use of credit derivatives, new credit markets have developed in parallel to the traditional *market for credit risk* embedded in bond and loan trading, such as the *market for default probabilities* or the *market for recovery rates*.<sup>8</sup>

## 1.2 LOAN CDS (LCDS)

Similar mechanics to CDS but applied to loan underlyings. Still in its early stages, it represents one of the products with highest growth potential.<sup>9</sup>

- Underlying credit instrument(s):
  - Secured debt (i.e. loan) of a single company.

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<sup>6</sup>. Rule (2001) contains further details on the characteristics and mechanics of credit derivatives. <sup>7</sup>. Assuming cash settlement of the contract. <sup>8</sup>. For a detailed explanation of different ways to trade and hedge recovery rates, see Elizalde, Gallo and Shah (2007b). Traditional bond CDS is reference entity based, while loan CDS is usually reference obligation based. <sup>9</sup>. See Elizalde, Gallo and Shah (2007a) for further details on LCDS products, markets and trading strategies.

- Payoffs: Similar to CDS.
- Main risk factors: Similar to CDS.

The loss given default will generally be lower in LCDS than in CDS, other things equal, as the latter refer to secured debt whereas the former refer to unsecured debt.

Depending on the contract, LCDS investors are also exposed to the refinancing of the underlying loan. Thus, LCDS open the way for a new market to develop: the *market for refinancing probabilities*. Investors could hedge or take exposure to the risks derived from firms refinancing their existing secured debt.

### 1.3 CDS INDICES

The second most liquid credit derivative instruments, CDS indices consist of a single contract giving exposure to a portfolio of CDS, i.e. to the credit risk of a group of companies. They represent the fastest growing product in the credit derivatives arena, and have become benchmarks for credit markets in the same way that the top equity indices (Ibex, S&P, FTSE, Nikkei, Dax ...) serve as benchmarks for equity markets. Referred to as either iTraxx or CDX indices, they allow investors to gain exposure to credit markets in North America, Europe, Asia and emerging markets both at the investment grade and high yield level.

Their market share grew from 9% in 2004 to 31% in 2006; they also serve, like CDS, as building blocks for other derivative products. The standardisation of the contracts and transparency of the product mechanics have boosted the use of CDS indices.<sup>10</sup>

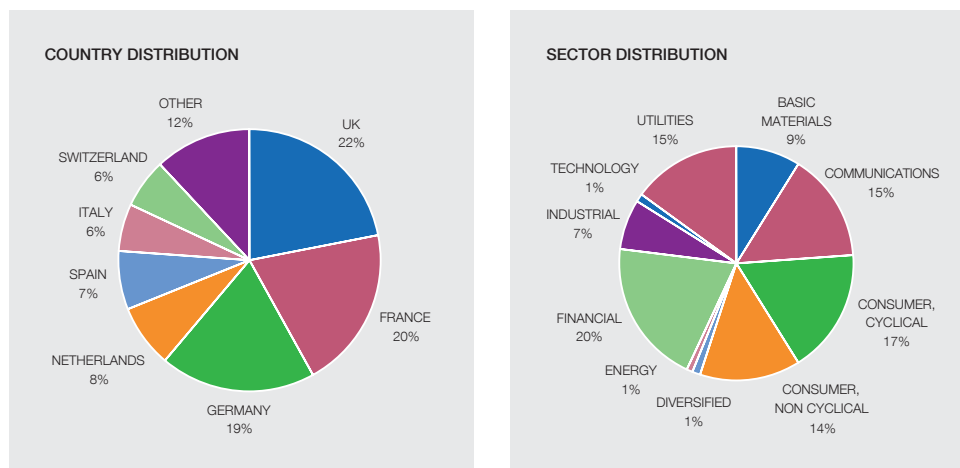
For example, iTraxx Europe and CDX IG are two CDS indices referring to 125 European and North American investment grade companies respectively. In order to be included in those indices, companies have to be rated investment grade and have sufficient liquidity in their CDS contracts. The index rules guarantee a diversified portfolio of companies in terms of sectors and countries. Chart 6 shows the country and sector distribution of the iTraxx Europe index.

- Underlying credit instrument:
  - Portfolio of CDS.
- Payoffs:
  - Protection buyer pays an annual fee until maturity on the contract notional.
  - Protection seller pays losses in case a default in any of the index companies, at the time of default. For a protection seller, a CDS index provides similar exposure to a portfolio of individual CDS.
- Main risk factors:
  - Default probabilities of each underlying firm.
  - Loss in case of default of each firm.

Chart 7 shows 5-year spreads of iTraxx Europe and CDX IG North America since August 2004.

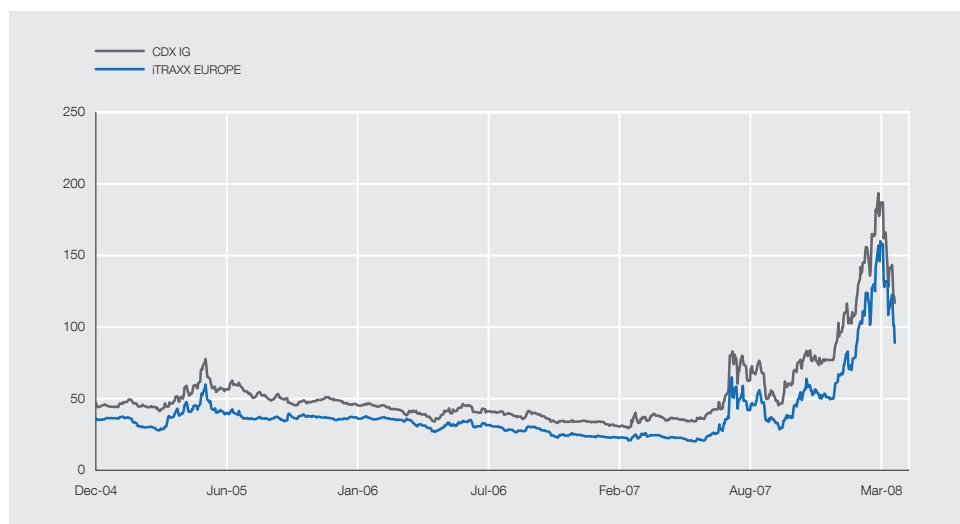
<sup>10</sup>. See Elizalde, Gallo and Shah (2007c, d) for further details on CDS indices.





SOURCE: Bear Stearns, Bloomberg.

ITRAXX EUROPE AND CDX IG NORTH AMERICA SPREADS- 5 YEARS MATURITY



SOURCE: Bear Stearns. In basis points.

The spread (in basis points) represents the annual compensation the protection seller receives for agreeing to pay any losses due to the default of any of the firms in the index in the next 5 years. Assuming a 100 basis points spread for iTraxx Europe and a contract notional of 100 million euros, the protection seller will receive 1,000,000 euros per year as long as there is no default in the index companies. Since iTraxx is an equally weighted portfolio, the exposure to each company is 0.8% (=1/125) of the contracted notional, i.e. 800,000 euros. If a company in iTraxx were to default with a 50% loss, the protection seller would pay 400,000 euros to the protection buyer at the time of the default.<sup>11</sup> From then on, the new index would only have 124 companies and the contracted notional would be reduced by 800,000 euros to 99.2 million; the protection seller would keep receiving 100 basis points per year on the new notional.

Chart 7 shows the spikes in credit spreads since the summer of 2007, which can only be compared to the spread levels in May 2005. As we will see next, though comparable in terms

11. Assuming cash settlement.

of spread levels both periods were completely different regarding other risk factors such as default correlation and spread volatility.

#### 1.4 COLLATERALIZED DEBT OBLIGATION (CDO)

Also referred to as *tranches*, CDOs slice up the credit risk of a portfolio of credit instruments.

- Underlying credit instrument:
  - Portfolio of credit instruments. The name of the CDO derives from the composition of the underlying portfolio:
    - CBO (collateralized bond obligation) if composed of bonds.
    - CLO (collateralized loan obligation) if composed of loans.
    - CSO (collateralized synthetic obligation) if composed of CDS.

Being equivalent to a portfolio of CDS, a CDS index can be used as the underlying instrument for a CDO. In that case, the CDO is usually referred to as an index tranche.

- Payoffs:

The total credit risk (i.e. possible losses due to default) on a CDO adds up to the credit risk of the underlying portfolio. Such credit risk is sliced up and allocated to different tranches: a CDO is just a way to redistribute the potential losses on a credit portfolio among different investors to suit the risk-return profiles of each of them.

As the potential losses are distributed to the different tranches, so are the returns (i.e. coupons or spread) that the portfolio generates. Obviously, those tranches that assume higher or more probable potential losses will have to be compensated with a higher share of the total portfolio returns.

Each tranche is characterised by a pair of attachment and detachment points, which indicate the default losses in the portfolio that will be paid by the tranche investor (protection seller) if they are realised.

For example, in a 3%-6% tranche (3% attachment, 6% detachment) the protection seller will bear any losses in the portfolio above 3% and up to 6%. Let us assume that the total losses of the portfolio at maturity amount only to 2%; in that case the protection seller of the 3-6% tranche will not suffer any notional loss. If the total losses of the portfolio had been 4.5% instead, the 3-6% investor would pay 1.5% of the total portfolio losses (which accounts for one half of the tranche notional). If the total portfolio losses go above 6%, the 3-6% tranche protection seller will pay 3% of those losses, i.e. all her committed notional. Notice that a portfolio of credit instruments is equivalent to a 0-100% tranche.

The arranger of a CDO starts up with a portfolio of credit instruments and sells the credit risk of that portfolio in different tranches, e.g. 0-3%, 3-6%, 6-9%, 9-12%, 12-22% and 22-100%, in such a way that all the default losses of the original portfolio will be borne by the tranche investors. Each tranche investor will receive an appropriate compensation (in the form of a spread or coupon) for the risk taken.

The tranche absorbing the first default losses (0-3% in the above example) is referred to as equity; the next tranches (e.g. 3-6%) as mezzanine, and the rest (e.g. 12-22%) as senior tranches. The last tranche (e.g. 22-100%) is called the super-senior tranche.

In a cash CDO, the underlying portfolio consists on cash credit instruments; thus, arranging a cash CDO requires building the portfolio of bonds or loans, which can be a lengthy process (unless the arranger already has the bonds in her portfolio, e.g. a commercial bank trying to offload the credit risk of that portfolio).

In a synthetic CDO, the underlying portfolio is built up of CDS or LCDS. As we explained above, CDS and LCDS provide the same credit risk exposure as bonds or loans. Rather than buying the bonds or loans, in a synthetic CDO the arranger will sell protection on a portfolio of CDS or LCDS.

For further details on the mechanics and pricing of CDO tranches see St. Pierre et al. (2004), Cousseran and Rahmouni (2005) and Elizalde (2006b).

– Main risk factors:

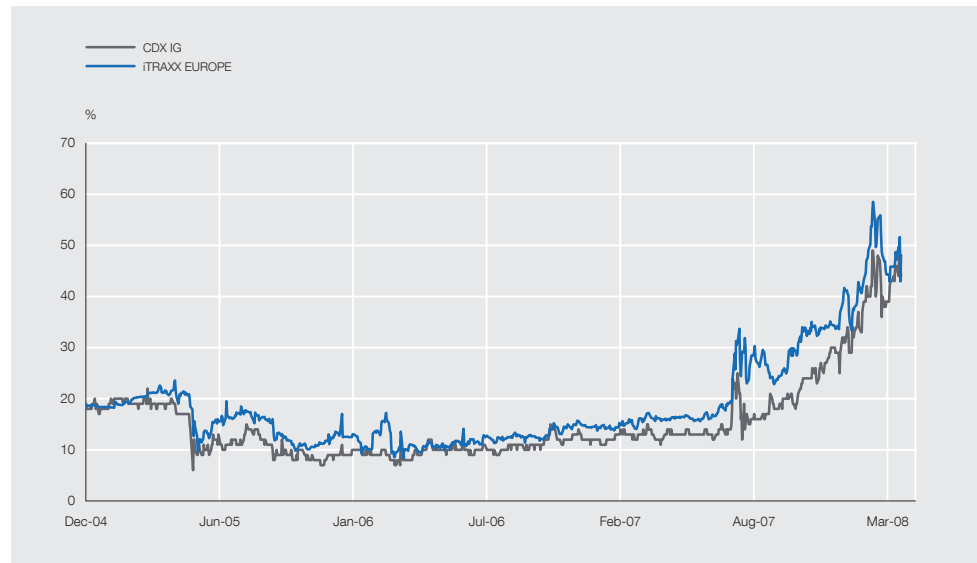
- Default probabilities of each credit instrument in the underlying portfolio.
- Loss in case of default of each credit instrument in the underlying portfolio.
- Correlation between the credit risk of the firms represented in the underlying portfolio.

CDO tranches introduce a new risk dimension for the credit investor, namely the correlation, i.e. degree of dependence, between the credit risk of the firms in the underlying portfolio.

In a CDO, the investor gains exposure to all the above risks. However, as with any risk dimension (defaults, recovery rates...), credit derivatives can be combined to allow investors to gain exposure to just the credit risk correlation. In other words, the investor can express a view on the future level of such correlation.

The standardisation and popularity of CDS indices (CDX and iTraxx) has led to the development of a liquid market on index tranches and hence a *market for default correlation*. Chart 8 shows the default correlation priced into both iTraxx Europe and CDX IG tranche markets since December 2004. A higher correlation level reflects a higher market perception of the dependence or linkage between the firms credit quality.

The sharpest moves in the correlation market correspond to May 2005 and to the aftermath of the credit crisis that started in the summer of 2007 (especially during July 2007 and February 2008). As we pointed out in Chart 7, both periods saw significant increases in credit spreads. However, the market sentiment about the nature and consequences of such movements was entirely different. In May 2005, the credit problems and rating downgrades in the US auto sector were perceived by the market as isolated or idiosyncratic events, and default correlations fell sharply. In July 2007 and February 2008, the concerns about a global credit crisis and



SOURCE: Bear Stearns. Historical 5 years 0-3% tranche correlation

the liquidity problems in the financial sector triggered a significant spread widening in all indices accompanied by a substantial increase in default correlations due to the systemic connotation of the crisis.<sup>12</sup>

Credit correlation is an important risk dimension in credit markets in addition to credit risk (i.e. spread) levels. *The credit derivatives market allows investors to take a view on or hedge any single risk dimension.* We have already mentioned the different markets for default risk, recovery risk and correlation risk; though the most important ones, those are not the only risk markets in the credit derivatives space. For example, credit risk volatility represents a new and growing market fuelled by the liquidity in the credit options market.

1.5 OPTIONS ON CREDIT PRODUCTS

With a long history in equity markets, the *volatility market* is taking off in credit markets fuelled by the growing liquidity of credit derivative products and the familiarity and confidence of market participants with this market.

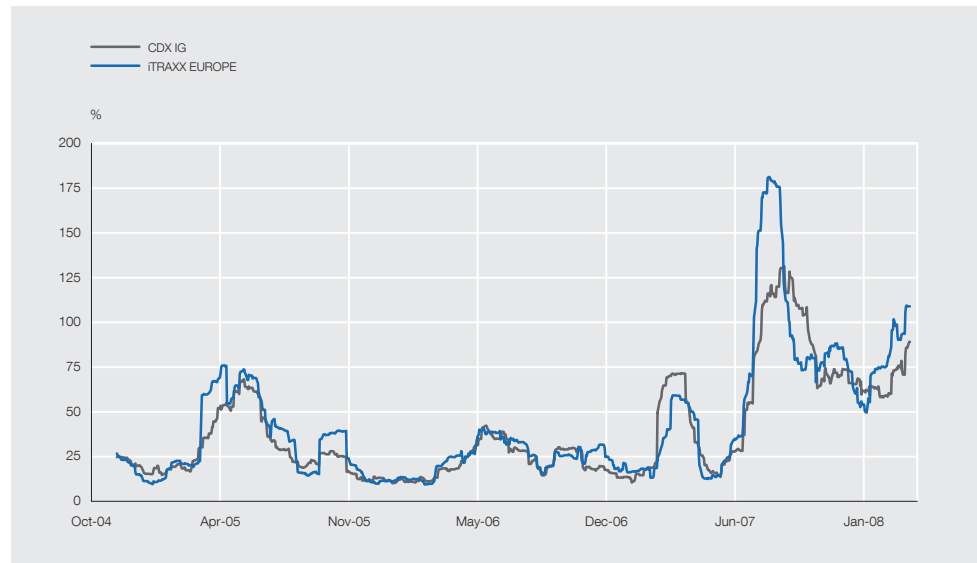
– Underlying:

- Thought options can be implemented in any instrument with a market price (i.e. traded spread), the credit volatility market is centered around options on CDS indices (iTraxx Europe, iTraxx Crossover<sup>13</sup> and CDX IG). Options can also be found on CDS of individual companies as well as on index tranches.

– Payoffs:

- All the traditional machinery of option contracts (calls, puts, straddles, strangles, butterflies...) is applied to the traded spread level of credit instruments.

<sup>12</sup> Belsham and Vause (2005) review the mechanics of the tranche and correlation markets. <sup>13</sup> iTraxx Crossover is a European CDS index of 50 “cross-over” companies with ratings below BBB- and liquid CDS trading. It has become one of the most liquidly traded indices and a benchmark for the European non-investment grade credit market. For further details see Elizalde, Gallo and Shah (2007c).



SOURCE: Bear Stearns. 30 day realised volatility of 5 years spreads.

– Main risk factors:

- Spread level of the underlying instrument.
- Spread volatility.

Option contracts on CDS instruments have been widely used by market participants in the last few years. Investors have recently been buyers of spread options as an efficient tool to hedge their credit portfolios. Hedge funds have been active players on the volatility front. Investment banks have used the potential of options to enhance and complement new and existing structured products.

Chart 9 shows the realised volatility of spread levels of iTraxx Europe and CDX IG. The increase in spread levels during the second half of 2007 was characterised by high volatilities due, among other things, to the uncertainty about the scope of the credit and liquidity problems.

#### 1.6 OTHER CREDIT DERIVATIVES

One of the key advantages of the credit derivatives market is its ability, building on its standard and liquid products, to design a wide range of structured credit instruments tailored to investors' needs.<sup>14</sup>

The following list is a sample of some of the better known structured (or bespoke) credit products:<sup>15</sup> basket products (first to default, ...), CPDO, CPPI, zero-cost protection, combination notes, principal-only notes, forward products, constant maturity products, fixed recovery products, principal protected products, super senior tranches and leverage super senior tranches...

The market gyrations during the summer of 2007 spread fear into the ranks of bullish investors, swiftly turning yield-hunger into risk anxiety. Whether a short-term crisis or the start of

<sup>14</sup>. For a detailed analysis of structured credit products see Elizalde, Gallo and Shah (2007e, 2008a). <sup>15</sup>. Elizalde, Gallo and Shah (2007e) review the characteristics of the main structured products.

more volatile times, this left a strong footprint on investors' inclination towards structured credit.

On the other hand, dislocations have improved potential returns to levels not seen in years. Indices and tranches are now trading well above rating-implied losses, up from flat risk premium in investment-grade and negative in crossover and high yield.

## **2 Opportunities for the Credit Market Players**

Credit derivatives open a whole new range of opportunities for credit market participants.

### *– Hedging of credit portfolios*

Traditional credit investors tend to manage long-only credit portfolios whose performance in deteriorating credit conditions is significantly limited by their inability to quickly and efficiently reduce their long exposure and/or take short credit views.

For example, taking a short position in the bond market involves selling a bond short, which requires its previous borrowing through a reverse repo or stock borrowing contract. The liquidity of these contracts is low and patchy.

In the credit derivatives market, taking short positions is as easy, liquid and straightforward as taking long positions. Thus, credit derivatives represent a powerful tool for credit investors to hedge and manage the risks in their portfolios, especially when defensive (i.e. short) positions are required.

### *– Provide access to all credit markets to any type of investor*

Credit derivatives allow all types of investors to take exposure to any of the markets represented in the credit market space, irrespective of their size, geographical location... As an example, the synthetic loan market was developed as a way to provide access to a market which, initially, was hardly accessible except to bank lenders and large institutional investors.

### *– Increasing the degree of completeness of the credit market by making tradable any credit risk dimension: default probabilities, recovery rates, credit correlation, credit volatility, refinancing probabilities...*

### *– Bring standardisation to the credit market*

Bond and loan contracts are primarily designed to fit the funding needs of the borrowing companies, not those of investors. Credit derivatives provide a mixture of standard and bespoke (i.e. tailored) contracts to fit the needs of any investor.

### *– Facilitate bank credit portfolio management, both from an economic and a regulatory capital perspective.*

Financial institutions specialise in a particular sector or geographical area, which can cause a significant risk concentration in their books. Through the use of credit derivatives they can reshape those risks with added flexibility. Credit derivatives allow financial institutions to separate the risks in their books from their lending decisions, which might be their competitive advantage.

Banks can outsource risks by buying credit risk protection on those borrowers, sectors or geographical areas which constitute the bulk of their business; they can arrange CDOs or CLOs to directly remove those credit instruments from their portfolios, all without compromising the relationship with their main clients. At the same time, they can take exposure to borrowers, sectors or geographical areas under-represented in their core lending business.

With the new Basel II accord on bank capital regulation already in operation, banks can use credit derivatives to shape the risks in their portfolios and achieve a better trade-off of risk vs. capital requirements.

- *Market transparency and price discovery* in the credit market has increased as credit derivative products provide additional sources of pricing and therefore of risk information, which reduces arbitrage opportunities and makes the credit market more efficient (for example by providing banks with additional information to price loans and other less liquid credit exposures).
- *Increase the liquidity in the cash (i.e. bond/loan) market* as market participants arbitrage the differences between cash and synthetic products (e.g. basis trades, arbitrage CDOs). The liquidity in the derivatives market is not constrained by the amount of actual debt issued and traded.

As explained in previous sections, in a CDO a portfolio of credit instruments is repackaged and sold in different tranches or slices to investors. This process is also known as *securitisation* and is not by any means particular to corporate credit instruments. In fact, securitisation has been applied to mortgages since the 1960s.<sup>16</sup> Several federal government sponsored agencies exist in the US, contributing to the popularity and development of these markets. The benefits and rationale of securitisation have been proved over the years; securitisation has been applied to home equity loans, credit card receivables, auto loans, student loans, commercial bonds and loans, leasing receivables... Soccer followers would also remember the securitisation of Arsenal's ticket sales, which helped to refinance its new London stadium.

The mechanics, risks, liquidity, standardisation and transparency of each type of securitisation can be significantly different. Substantial differences exist and market participants and commentators should know them and take them into consideration when judging the benefits/drawbacks of each one. Increasing the degree of completeness in any market requires, by construction, products with new, non-traditional features.

Securitization in general and credit derivatives in particular allow banks to diversify and hedge their credit portfolios.<sup>17</sup> Therefore they can be used to control and reduce the risks on the arteries of the financial system so they are better suited to withstand any shock. It is the responsibility of market participants and financial regulators to use securitization and credit derivatives to strengthen the financial system. Credit derivatives have changed the shape of the credit market and require all market participants to understand it, develop new and update existing risk systems...

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<sup>16</sup>. See Estrella (forthcoming) for a review of different securitisation markets. <sup>17</sup>. See Rule (2001) and Cousseran and Rahmouni (2005) for alternative analyses of the impact of credit derivatives on the stability of the financial system.

On the same lines, market participants should be aware of the moral hazard and possible changes in market participants' incentives (e.g. monitoring incentives by banks) that credit derivatives have introduced. As Elizalde, Gallo and Shah (2008b) describe, the lessons to learn from the current credit crisis are about incentives, not about products. While credit derivatives have been blamed for being a cause of the current crisis, the authors argue that it is their past use, not the instruments themselves, which determined the current course of events. The latest Global Financial Stability Report by the IMF<sup>18</sup> reiterates that *"It is important to note that securitization, per se, was not the problem."*

### 3 The Taming of Spreads (Pre-Summer 2007)

According to several economists, *no other economic cycle had been so reliant on liquidity and availability of credit*. This is in part attributable to easing monetary policy, but is also due to changes in lending and the transmission mechanism of monetary policy.

The major innovation in this regard has been securitisation, a process which started two decades ago in mortgage markets. The emergence of credit derivatives on investment grade and high yield corporate debt caused a further exponential boost in the last five years.

As asset-backed securitisation included most types of lending, banks have been able to deal more flexibly with their balance sheet exposure. By originating a collateralized obligation, lenders are able to diversify their exposure and/or to overcome funding problems due to higher rates or a decrease in deposits. On the other hand, securitisation also influenced the tolerance for new lending, by allowing risky debt to be outsourced to the market.

Thus, credit derivatives in particular, and securitisation in general, provided banks with the means to outsource risk from their books and free up credit lines ready to be used again in new lending activities. Credit investors readily absorbed those risks enabling banks to increase their lending. Altman (2006) writes about an *"...unprecedented growth in liquidity from non-traditional lenders, like hedge and private equity funds, as well as, again, from traditional lenders."* He cites this source of liquidity as one of the main reasons behind the low default rates during past years.

The negative (or very close to negative) interest rates during several years early this decade boosted the incentives of banks and other high-credit-quality financial institutions to borrow money, which was subsequently lent to consumers and corporations. Securitisation allowed banks to outsource from their balance sheets (either physically or synthetically) the risks derived from their lending activities; thus, banks were able to recycle and reuse their credit lines more freely.<sup>19</sup> Thus, securitisation compounded the impact of a loose monetary policy regime by providing the economy with extra liquidity.

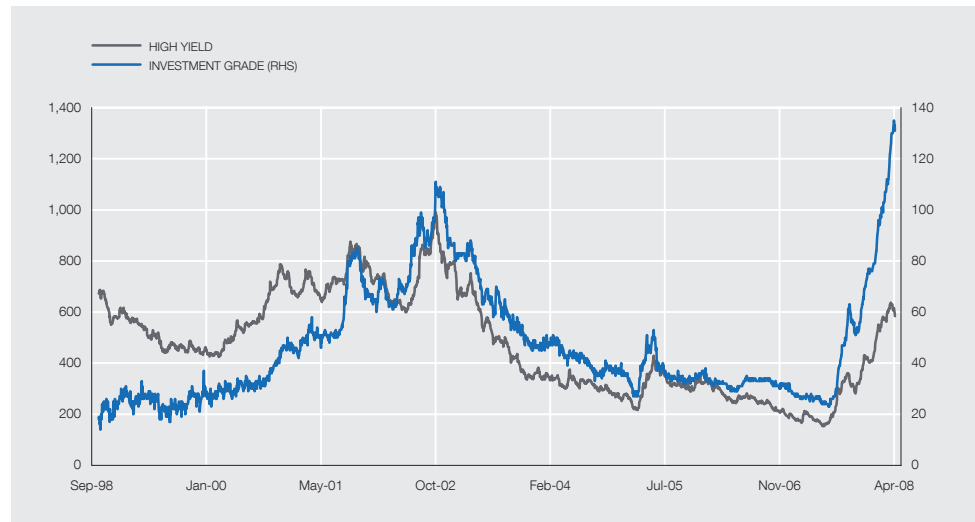
The availability of credit to corporations reduced their funding costs and therefore boosted their "fundamentals". Many market participants noted the high levels of cash holdings by firms in the last years as a sign of their credit quality.

As the perceived credit quality of firms increased, the compensation that credit investors received for taking credit risk was reduced. To heighten their yields, credit investors relied, among other things (such as covenant-light loans) on synthetic instruments to obtain leverage. The demand for credit risk exposure, synthetically created through this channel, pushed down spreads even further. The process by which this happened is laid out in Gallo (2007).<sup>20</sup>

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18. See IMF (2008). 19. This phenomenon has been highlighted by Hirtle (2007). 20. See also Cousseran and Rahmouni (2005).





SOURCE: Bloomberg. In basis points.

Through this process, the synthetic CDO machine has contributed to reduce corporate financing costs in recent years. More importantly, the pipeline of structured credit instruments ready to be issued at higher leverage has acted as an “anchor”, pulling spreads lower after each shockwave. Every time spreads drifted higher and credit became more attractive, new deals were issued, taking spreads back down.

The above process of improving economic fundamentals, easy monetary policy, bank lending, risk outsourcing, securitisation and synthetic credit issuance has driven credit markets in recent years, significantly contributing to the spread compression observed from 2003 to 2007. Market participants coined the term “CDO-bid” to describe these mechanics.

Hirtle (2007), using a sample of bank loans between 1997 and 2005, finds evidence supporting the idea that credit derivatives have allowed banks to increase the supply of credit to corporates.

One of the major risks of the process outlined above is a sudden disruption of any of its components which brings the rest to an end. Think of summer 2007: securitisation stops and liquidity vanishes.

Since monetary policy operates through the credit markets, and securitisation has transformed bank lending, it is rational to think that securitisation has also changed the transmission mechanism of monetary policy. Moreover, as derivative structured credit vehicles emerged in the last few years, the impact of securitisation on liquidity has increased massively. Being unfunded products, synthetic CDOs create levered credit exposure, which is then hedged through the underlying index and single-name default swaps.

Estrella (forthcoming) investigates “*whether the cyclical effects of monetary policy have been influenced by the secular growth in securitisation in recent years. In particular, when the central bank makes a specific monetary policy move – such as increasing the overnight bank rate by 50 basis points – is the ultimate effect on GDP different from what it would have been in the 1960s, when securitisation was virtually nonexistent?*”, concluding that the analysis “*suggests that securitisation has likely weakened the impact of any policy move.*”

Monetary policy tends to be countercyclical in nature, while securitisation is a procyclical phenomenon. A deeper analysis of the impact of securitisation is needed in order for market players, and especially central banks, to understand the validity of traditional monetary policy measures. Further research is needed in this area.

#### **4 I Know What You Did Last Summer (2nd half of 2007)**

The last nine months have been one of the choppiest periods in financial markets, to say the least. In what follows, we list some of its stages in chronological order (albeit with plenty of overlapping).

*The process of increasing liquidity/improving credit quality which drove credit markets for the previous years was halted at the start of the summer of 2007.* Though not of great importance, the market consensus seems to point to the concerns of the US mortgage market and its potential spill-over into the broader economy as the trigger of the events. The “subprime problem” just unveiled the risks for the economy derived from years of debt accumulation from American consumers.

As a consequence, securitisation slowed down dramatically, initially in the mortgage and asset-backed markets, as the forecasts for defaults and losses worsened in the housing sector. The subsequent problems and rumours about the exposure of investment banks, commercial banks and other institutions to the mortgage market (both through cash and derivative products) caused the liquidity in the interbank market to dry up. Market participants who were over-relying on short term liquidity started having serious problems (e.g. SIVs, Northern Rock...).

Central banks hurried to intervene through emergency liquidity operations. The fears that the liquidity problems could turn into a credit crunch, caused a *general sell-off in credit markets*.

After years of credit exposure accumulation, and amid sharp increases in credit spreads, investors rushed to hedge their credit portfolios. However, the consensus at the time (July/August) was of a transitory increase in spread levels due to the market turbulence, not of the risk of any default. The preferred hedging instruments turned out to be, naturally, the cheapest ones, which happened to be the ones with a higher associated credit quality (i.e. rating): investors bought protection on financial credits, on highly rated tranches... Rather than the typical flight-to-quality which characterises crisis periods, the credit markets experienced a *flight-from-quality* phenomenon which increased the perceived credit risk of the safest credit instruments.

For the first time, spreads in financial credits surpassed those of corporate credits. Chart 8 shows how the spread of iTraxx Financials CDS index (a sub-index of iTraxx Europe composed of 25 European blue-chip financial institutions)<sup>21</sup> reached the same rates as iTraxx Europe: lenders trading at the same risk level as borrowers. What is the rationale and sustainability of a financial system where banks fund themselves at the same levels as corporations?

The supposedly transitory nature of the credit problems was reinforced by the absence of any negative news coming from the corporate sector. No rating downgrades, no profit warnings... “Fundamentals remained strong” as companies had been piling up cash and cheap financing during years.

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21. Components of iTraxx Financial index at the time: ABN, Aegon, Allianz, Generali, Aviva, Axa, Monte dei Paschi, BBVA, Espirito Santo, BSCH, Baclays, Capitalia, Commerzbank, C. Agricole, C. Suisse, Deutsche Bank, Hannover Re., Intesa, Munich Re., Swiss Re., RBS, UBS, Unicredit, Zurich Ins.



SOURCE: Bear Stearns. 5 year spreads in basis points.

Besides the healthiness of corporate balance sheets, credit spreads remained unsettled as the mark-to-market in credit portfolios was undermining investors' confidence. August witnessed an unprecedented increase in uncertainty as *volatility in the credit markets took off* (Chart 9).

The impact of the volatility on the mark-to-market of highly rated (AAA/AA) products (from structured to commercial bank spreads) catapulted rating agencies into the spotlight, questioning not only the soundness of their rating process, but also that of a rating-based *investment culture*: from investment decisions to central bank regulations.

As the validity of the most widely used risk metrics vanished, the uncertainty about the true risks in the credit market soared. For flexible investors, the dislocations created in such a volatile environment were plentiful; besides a few casualties, the returns of credit hedge funds grew hand in hand with the confusion of the rest of market players.

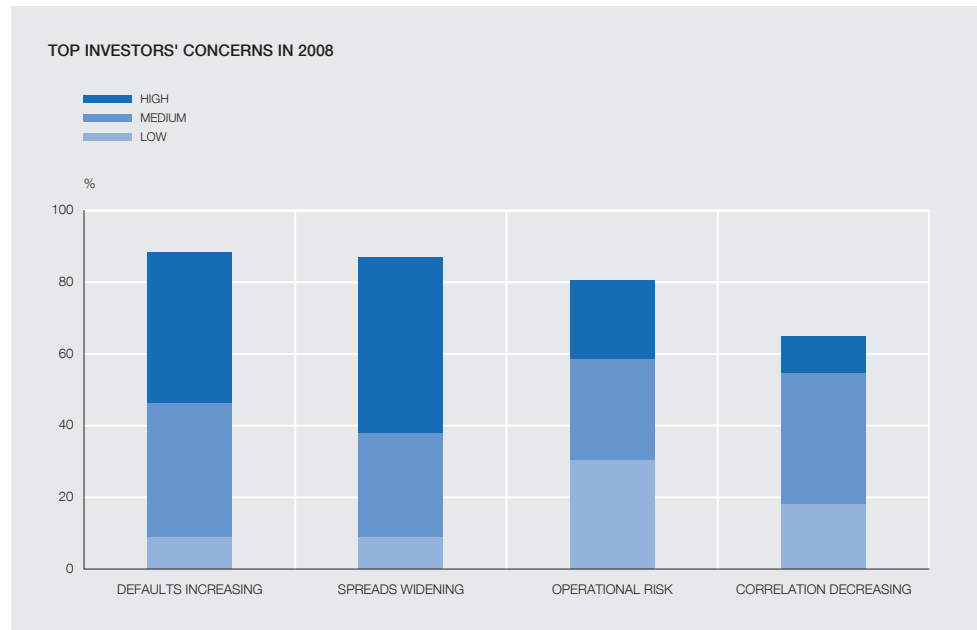
Investors who pre-positioned during July and August for volatility increases, through credit options and CDS index tranches, experienced double-digit returns. As explained by Gallo, Elizalde and Shah (2007i), some of these strategies contributed to increase the correlation levels traded in the tranche market, reinforcing the systemic connotation of the crisis.

In the meantime, the worries about potential unwinds of the AAA positions of SIVs remained, besides concerted efforts (e.g. super-SIV fund) to ease their situation. The concern in the credit markets was still spread widening rather than real defaults.

The dislocations in the credit markets (financial spreads above corporate spreads, overshooting of spreads in AAA structured products, market volatility) persisted as the "CDO-bid", once a spread shock-absorber, vanished. Credit structured investors postponed any new investment until the new year after significant losses in a few months.

However, so many problems during so much time have caused the mood of investors to shift. By 2007 year end, the impact of the liquidity and credit crisis on the economy took priority in investors' minds. The results of Bear Stearns' Global Credit Investor Survey<sup>22</sup> published in

22. See Elizalde, Gallo and Shah (2007g).



SOURCE: Bear Stearns 2007 Global Credit Investor Survey.

December revealed that, *for the first time in many years, investors started to worry about defaults.*

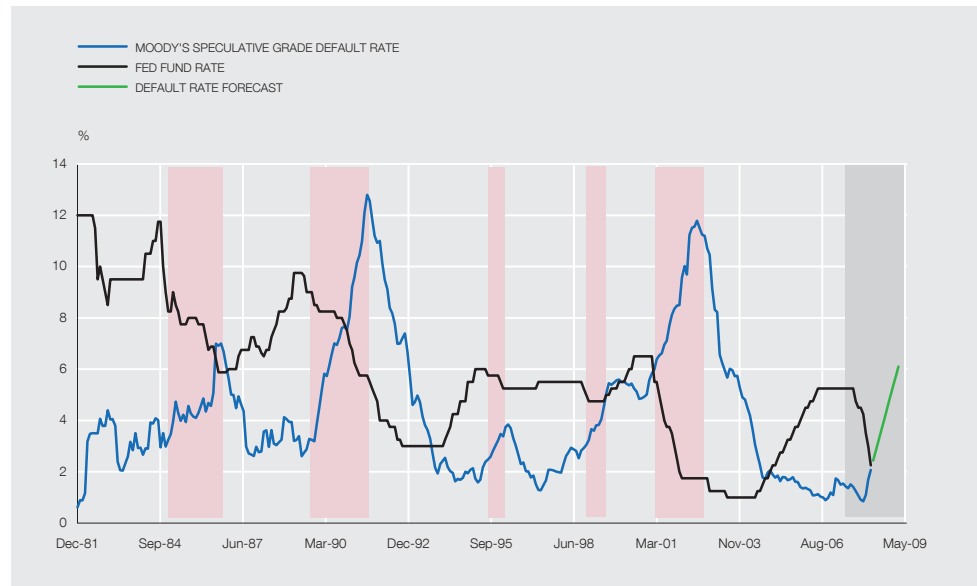
According to the survey results, what was initially perceived to be a problem confined to the US mortgage market may take a hefty toll on the global economy in 2008. One third of investors believed that a general slowdown or recession could cause further spread widening in the next few months. Additionally, 88% of respondents were concerned about defaults, while 42% say it is a high risk, putting it above spread widening as the top concern for 2008 (Chart 12).

Although this view may be overly pessimistic for the near term, it may prove to be right throughout 2008: high systemic risk can eventually create distressed situations in single names. However, the timing of idiosyncratic events is hard to guess. Historical data shows how speculative grade defaults have picked up around three months after each Fed easing cycle, and peaked around 9-12 months after. The Moody's forecast for the next 12 months was consistent with this view, pointing at a default rate many times higher than the current one (Chart 13).

Where from here? After six months of turmoil, credit concerns were having a strong impact on lending. The Fed, ECB and Bank of England were all registering stricter lending standards and forecasting further tightening in 2008.<sup>23</sup> What was initially a financials-related crisis is likely to end up damaging corporate borrowers as the cheap liquidity they enjoyed in the past years dries up.

In a recent report, Moody's forecasts that the default rate for speculative-grade issuers could rise fivefold in the next 12 months, assuming an economic slowdown; while it could touch double digit levels in the event of a recession.

23. Please see: "Senior Loan Officer Opinion Survey on Bank Lending Practices", Federal Reserve Board of Governors; "The Euro Area Bank Lending Survey", European Central Bank, 5 October 2007; "Credit Conditions Survey: Survey Results 2007 Q4", Bank of England, December 2007.



SOURCE: Bear Stearns, Federal Reserve, Moody's. Shaded areas highlight the lag between the start of a Fed easing cycle and the following peak in defaults. Data as of December 2007.

In our opinion, the outburst of systemic risk experienced recently is unsustainable in the long-term. While spread volatility is likely to continue going forward, we argue that risk will gradually shift from systemic to idiosyncratic. On one hand, corporate results will give investors the ability to discriminate between issuers which have been hit by higher risk and more stable ones. On the other hand, easing monetary and fiscal policy will decrease the overall negative sentiment and potentially re-start activity on synthetic CDOs. At a sector level, corporate spreads will have to move further than financials, bearing the additional cost of borrowing. Within the CDO capital structure, value is likely to go back into junior tranches, which capture the default risk in the portfolio.

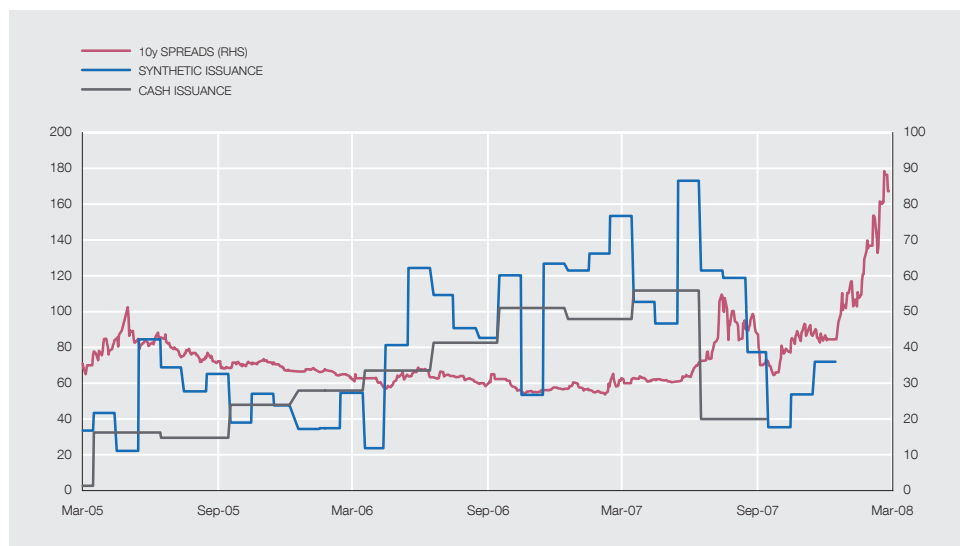
As further risk re-pricing is on the way, we think that a complete return to normality for securitisation is hardly possible. While the synthetic corporate CDO market remains structurally strong and has weathered the correction, investors are likely to shun other cash asset-backed securitisation products for a longer while.

**5 Credit Derivatives and Their Impact on Financial Markets: Are Central Bankers Still in the Driving Seat?**

By now nobody will have any further doubts about the importance of credit derivatives in financial markets and, as a consequence, in the broad economy. Credit markets act as the funding heart of the corporate and consumer universe. As we have outlined in the report, credit derivatives have the ability to impact the volume and prices of credit transactions, as well as the volatility in credit risk markets.

The impact on the economy comes through bank and corporate financing costs, which have been pushed down in the last few years by both cash and synthetic securitization. Chart 14 shows a time series of long-term spreads and issuance of structured products. In the last several years, any peak in spreads used to be followed by higher issuance, which would compress spreads lower, keeping financing costs stable for companies.

The recent market developments and the deterioration in economic fundamentals have reverted the mechanism: in recent months, issuance has decreased while spread volatility escalated. Any tightening in spreads is now used by investors to unwind prior structured



SOURCE: Bear Stearns, Creditflux. Issuance in USD billions. Spreads correspond to CDX IG index.

products which have suffered mark-to-market losses or downgrades, generating more volatility.

Securitization, which was effectively lowering financing costs during the past years, effectively vanished after the credit turmoil in the summer of 2007. As banks cannot recycle their lending any more (bonds, loans, mortgages...), they are not willing to lend as readily or in the same volumes as before.

The demand for securitized products has shrunk considerably. It is not a problem of the cost of lending, which monetary policy is trying to affect, it is a problem of the current lower ability and incentives of banks to pass on the lending to other investors.

At the same time, rating agencies are preparing new methodologies (see Fitch, 2008), which are more conservative and therefore would limit the entrance of new players in the market. Both these effects are *pro-cyclical*, and contrast sharply with the aim of monetary policy.

The net impact is uncertain: while the great injection of liquidity from central banks is eventually likely to succeed, it is clear that financial innovation has made great changes to the playing field, potentially reducing the power of traditional monetary policy. For this reason, understanding the mechanics and economic rationale of credit derivatives has never been so important.

The world economy seems to be heading into a recessionary period amid a fierce fight between anti-cyclical (monetary policies, fiscal stimulus) and pro-cyclical forces (securitization, rating agencies). We should not forget the role that Basel II can play in that fight. One of the most important characteristics of Basel II, the new accord on bank capital regulation, is the higher risk sensitivity to bank capital charges compared to its predecessor Basel I. The potential for such higher sensitivity to translate into pro-cyclical effects for the broad economy is unclear and has been one of the main areas of discussion during the past years.<sup>24</sup>

24. For a review of related literature, please see Elizalde (2006a).

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Un nuevo marco de seguro de depósitos para España  
*Pablo Campos, Miguel Yagüe e Iker Chinchetru*

El proceso de acumulación de reservas de divisas: posibles riesgos para la estabilidad financiera internacional  
*Enrique Alberola Ila y Santiago Fernández de Lis*

Determinantes microeconómicos de la morosidad de la deuda bancaria en las empresas no financieras españolas  
*Sonia Ruano Pardo*

La especialización de las entidades de depósito en el crédito a las empresas no financieras  
*Javier Delgado*

#### Número 13 – noviembre 2007

Algunas cuestiones relevantes en el proceso internacional de convergencia contable: IASB vs. FASB  
*Carlos José Rodríguez García y Alejandra Bernad Herrera*

La evolución de las operaciones de *Leveraged Buy Out* y su financiación: posibles implicaciones para la estabilidad financiera  
*María-Cruz Manzano*

El número de relaciones bancarias de empresas e individuos en España: 1984-2006  
*Gabriel Jiménez, Jesús Saurina y Robert Townsend*

Dimensiones de la competencia en la industria bancaria de la Unión Europea  
*Santiago Carbó Valverde y Francisco Rodríguez Fernández*

El proceso de apertura del sector bancario chino y el papel de la banca extranjera. Situación y perspectivas  
*Daniel Santabárbara García*

La bancarización en Latinoamérica. Un desafío para los grupos bancarios españoles  
*José María Ruiz*

#### Número 14 – mayo 2008

Regulación e innovación en la reciente crisis financiera  
*Jaime Caruana*

The financial turmoil of 2007-?: a preliminary assessment and some policy considerations  
*Claudio Borio*

Los déficits estructurales de liquidez y las tensiones en los mercados monetarios

*Javier Alonso*

Anatomy of a modern credit crisis

*Ángel Ubide*

La titulización de activos por parte de las entidades de crédito: el modelo español en el contexto internacional y su tratamiento desde el punto de vista de la regulación prudencial

*Eva Catarineu y Daniel Pérez*

Comparación histórica de episodios de turbulencias financieras globales

*Pedro del Río*

De los modelos de banca y la función de riesgos

*Francisco Sánchez Ferrero y Juan Andrés Yanes Luciani*

Understanding credit derivatives

*Abel Elizalde and Alberto Gallo*

