CONSEIL NATIONAL DE LA COMPTABILITÉ

NATIONAL STANDARD-SETTERS (NSS) FORUM

10 th september 2008 meeting

Accounting for Complex Financial Instruments in Inactive Markets

Contents

Introduction

The present paper prepared by the Conseil National de la Comptabilité (CNC) is a research paper which deals with the accounting for complex financial instruments.

The current financial crisis has made complex financial instruments one of the most critical accounting issues of the moment and raised a reasonable number of questions about the understanding of these instruments, their measurement (whether based on market prices or models) as well as the way profits and losses are recognised. In these circumstances, it appears useful to develop a technical contribution to the current debate in order to participate in improving the understanding of the difficult accounting issues that market participants are facing when determining the value of a so called complex instrument.

The CNC is aware that other organisations have undertaken work on the same issue – at least IOSCO, which has currently issued a paper on a similar topic and the IASB, whose Expert Advisory Panel and the staff are currently researching a similar topic.

The purpose of this paper, however, is to focus on the issues from a different angle from that adopted in recent research .The CNC decided to produce an illustrative example ,comprising a description of a complex financial instrument and present the practical issues preparers are facing when actually accounting for such an instrument. To do so, the CNC set up a small working group comprising preparers, auditors and regulators, all parties involved in practical issues when dealing with for complex financial instruments.

The CNC is pleased to make a contribution on the issue of complex financial instruments.
The instrument that was chosen – a synthetic CDO – is, purposely, not one of the most complex financial instruments that can be found currently in the market. However, for the sake of the readers, it is worth mentioning in this introduction that part 1 of this paper, which describes the instrument, remains highly technical, even if the instrument described is not of the most complex, as previously indicated. Part 2 deals with issues that will appear more familiar to standard setters.

Considering the technical complexity of the instrument and its description, the choice has been made to maintain the description in Part 1 for those readers that have an interest in this complex financial instrument itself which is frequently mentioned but never explained. For those readers that have no specific interest in the detailed features of the instruments, Part 2 can be read independently and is understandable on its own. When necessary, cross references have been added to enable the reader to refer back to the origin of the accounting issue, as discussed in the features of the instrument in part 1.

Slides will be provided a few weeks prior to the meeting, as a support of the presentation that will be made during the conference session.

PART 1 – FAIR VALUE ILLUSTRATIVE STUDY OF A "SYNTHETIC CDO"

1 - Objectives

1. **The objective of this research paper** is to illustrate through a real-life example, the issues facing financial statement preparers when applying IAS 39's fair value requirements in the context of complex and illiquid financial instruments.
2. **The paper analyses a collateralized debt obligation (CDO).** We further explain this choice below, particularly in the case where the underlying credits relate to investment grade corporates and the product is wrapped as a derivative.
3. **The study is structured into two parts**
    a. Firstly, we will provide the reader with a brief description of the instruments and the market in which it is traded as well as its main drivers. We will explain why its valuation at fair value requires the use of a valuation technique, and go through the description of such a valuation technique as well as an analysis of the required inputs.

    In this descriptive section, we will avoid non-useful highly technical considerations about modelling and use, as much as possible, self-explanatory language.

    However, it is also our intent to avoid over-simplification because we believe that the reader needs to understand that pricing a CDO is complex, challenging, and requires reassessments over time.

    b. Secondly, we will identify all the issues that the fair valuation of this instrument raises in practice. We will also describe those areas where the interpretation of the Standard is unclear or where we believe that some questions remain unresolved.
4. **Reasons for choosing a CDO as basis for our study**

    The main reason for choosing a CDO is that it is a typical complex and illiquid product.

    In addition, within the large universe of complex and illiquid products, investment grade corporate CDOs have gone through several market phases, making them a field for research on fair value determination. After being a purely exotic business for highly sophisticated investors and banks, with no transparency at all on prices, the market was hit by a first crisis in 2005, which resulted in an increased transparency and access to observable data for some categories of CDOs. Then, during the Subprime crisis, this market faced various issues, ranging from disappearance of liquidity and lack of observable data for the most liquid CDOs, to dislocation [***see glossary*** 1] in the recent period.

    Another reason for choosing a corporate investment grade CDO is that, although there is a variety of possible valuation techniques for such an instrument, the market practice is somewhat consistent. However, the most-used valuation technique requires numerous entity specific choices. This makes the CDOs an appropriate illustration for illustrating frontiers between entity specific and market models.

2 - Introduction to the unfunded synthetic CDO product

5. Under its most popular form (legal wrapper), a CDO product takes the form of a note issued by a special purpose vehicle (SPV), with assets bearing some credit risk (typically corporate bonds). Investors in CDOs have different motivations for purchasing CDO securities depending on which tranche they select.

- by buying the more senior part of SPV debt, investors are able to obtain better yields than those that are available on more traditional securities (e.g. corporate bonds) of a similar rating. In some cases, investors utilize leverage and hope to profit from the excess of the spread offered by the senior tranche and their cost of borrowing. This is because senior tranches pay a spread above free rate despite their high ratings. Investors include banks and insurance companies as well as investment funds.

- by buying the Junior part of the SPV debt, investors achieve a leveraged, non-recourse investment in the underlying diversified collateral portfolio (SPV assets). Mezzanine notes and equity notes offer yields that are not available in most other fixed income securities. Investors include hedge funds, banks, and wealthy individuals.

  The CDO product fundamentals, lie in the introduction of a subordination structure, starting from a given pool of assets ("tranching"), and giving exposure to the credit risk of one of the tranches. This objective can also be achieved under derivative format where the derivative contract reproduces the SPV mechanism. The portfolio of assets in the SPV is replaced by "theoretical" or "reference" portfolio, and the seniority structure contractually described.

  In this paper, we opted for this derivative format. This is because we wanted to avoid all the accounting issues associated with securities (in particular the classification issue) and SPVs. This will also allow us to concentrate on pure fair value measurement issues ("how to measure", judgments made,…).

6. **Introducing CDS (credit default swaps) Contracts** : CDS contracts are alternative ways of bearing equivalent credit risk of a given issuer without holding a funded issue (i.e. purchasing a bond). CDS contracts are over-the-counter derivative contracts :

   a. ***Under a standard CDS contract,*** the seller provides protection to the buyer against the credit risk of a reference bond. In exchange, the protection seller receives periodic predetermined cash flows for having provided the protection. Typical CDSs can be analysed as the combination of i/ a "premium leg" (for example 200bps paid on a quarterly basis based on the notional amount up to the default date) and ii/ a default leg equivalent to the protection.

   b. ***Under the basic default leg,*** no payment takes place, unless a default event occurs. In such a case, the protection seller receives the defaulted reference bond and pays the par amount ("physical settlement"). The contract terminates at this date.

   c. ***Under the basic premium leg***, payments are made quarterly, on an accrual basis up to the default time.

d. ***CDSs are in general physical settlement contracts***, but the default leg is usually assessed from a net cash settlement perspective, whereby the protection seller would provide, on occurrence of default, the par amount minus the expected recovery [***see glossary*** 2] from the referenced bond ("Net cash settlement" see Figure1).

e. ***CDSs contracts can identify several credit events triggering the payment of the default leg***, ranging from an issuer's default (failure to pay, bankruptcy…) to its restructuring.

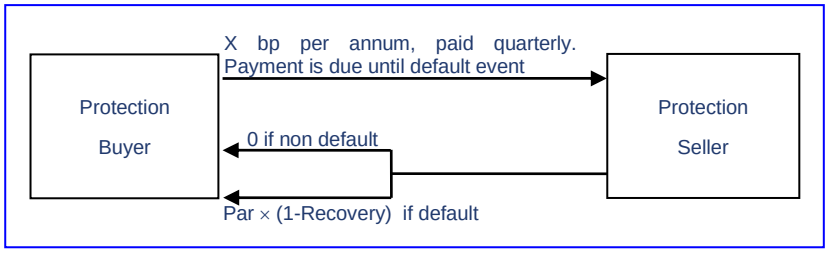


Figure 1 : CDS contract payment flows (Net cash settlement)

f. ***Typical CDSs contracts involve no notional exchange***, nor upfront payments. When traded at market price, the periodic payments (earned by the protection seller) compensate the expected loss[1] (incurred by the protection seller). Both legs have a value that is measured at inception. The market value of a standard contract at its inception is usually zero, because dealers calibrate the premium to have a nil value This is however only true for quoted CDSs, but is not an obligation for CDS counterparties (see also i below).

g. ***The default leg has a value because there is a probability of default [see glossary 3]*** : at any future date, assuming no default has yet occurred, there are two possible outcomes for the reference entity 1/ survive with a certain probability, and 2/ default with a certain probability. The sequence of these probabilities (termed conditional survival probability and conditional default probability) can be used to build a probability tree diagram and derive an expectation of discounted payments under the default leg.

h. ***CDSs are quoted as a "term structure of spreads" or "spread curve" [see glossary 4].*** Spreads quoted are associated with a certain maturity. Spreads represent the quarterly premium to be paid, by a protection buyer, for benefiting from the protection up to that maturity.

i. ***The quoted CDS spread resumes two types of information*** **:** the probability of occurrence of a default event, and the recovery. We can think about this by observing that higher recovery with higher probability of default assumption would lead to the same loss expectation than lower probability with lower recovery; and therefore to the same price.

[1] As shown in the figure 1, payments can be made under default leg, with a certain probability (probability of default). The existence of a non nil probability to pay, gives a value to this leg.

The corollary of the above is that for a given CDS quote, one cannot imply the probability of default, without making an assumption about recovery and vice versa. Indeed, when CDS is traded at market spread level, its market value is nil by construction, hence any change in the recovery assumption will be compensated with changes in the probability of default so that the market value remains nil. We oversimplify this by saying that a "CDS traded at market, is insensitive to the recovery" (one should say, we cannot imply the recovery level from the CDS quote).

When the CDS value is not fixed by construction at zero (i.e. non quoted CDS), there is a value, and a buyer would pay or receive an upfront payment. This is the case when the premium paid is higher than the quoted spread or when time passes and the premium is not the one quoted in the market (secondary market). When determining this value (or upfront payment), one needs to know both the recovery, and the probability of default.

The latter two observations combined mean that if one observes, at once, CDS spread quotes (relating to CDSs worth zero) and upfront payments relating to CDSs traded at a different spread level, one can resolve the equation and derive both implied default probabilities and implied recovery value[2].

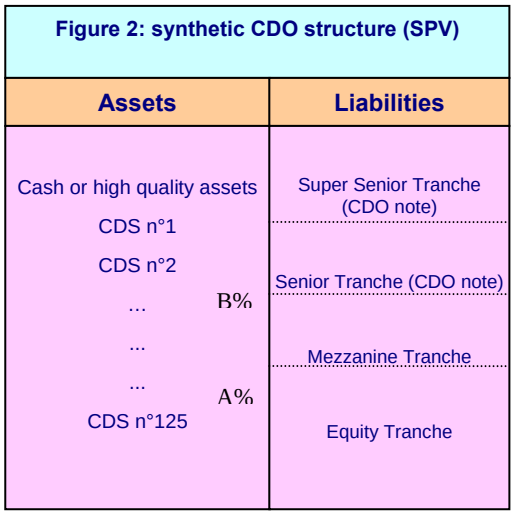
7. **Introducing CDOs structures** : The concept of pooling is at the heart of CDO products.

   (Preliminary note : further understanding of the descriptions below is provided in Section III, with a numerical illustration).

   a. ***The generic "CDO" term refers to the securitisation of pools of assets subject to default risk. "CDO" represent the notes issued by a special purpose vehicle,*** whose assets bear credit risk. Through holding the SPV notes, an investor bears the credit risk of the underlying assets. This format is called the **"funded"** CDO.

   b. The assets of the SPV are generally called "Collateral" of the securities issued. **"Cash"** CDOs refer to situations where the collateral is made up of cash instruments (such as bonds or loans). **"Synthetic"** CDOs refer to situations where the collateral combines high quality cash instruments with CDSs.

Figure 2: synthetic CDO structure (SPV)



[2] This requires a model.

c. ***Securities issued by the SPV can have different maturities and credit risk characteristics***. Different notes are called **"tranches".** Tranches are categorised according to the degree of credit risk they bear. Payment and redemption waterfall applies across tranches, with the most "senior" tranches taking preponderance over the mezzanine and the junior ones.

d. ***On the asset side, the SPV receives for each asset risk free rate and an additional margin***. *Depending on the format (synthetic or cash)* these margins correspond (resp.) to the CDS premiums or bond spreads. Margin remunerates the SPV for holding credit risk (probability of occurrence of a default event).

e. ***On the liability side, each of the SPV notes pay risk free coupons plus an additional margin (note margin)***. The margin depends on the seniority and features of the note considered.

f. ***The investor in a typical CDO note bears a credit risk corresponding to a certain level of losses in the collateral pool***. For example, the investor would be exposed to credit risk only if the losses exceed A% of the total asset portfolio, and the protection ceases if the losses exceed B%. Such note would be called "tranche" with attachment A% and detachment B%.

Attachment and detachment read as follows : 1) as long as the cumulative portfolio loss is below A%, the tranche will be redeemed in full 2) if total loss is between A% and B%, the note will be redeemed partially and 3) if the cumulative portfolio loss is above B%, the tranche is not redeemed at all (wiped out).

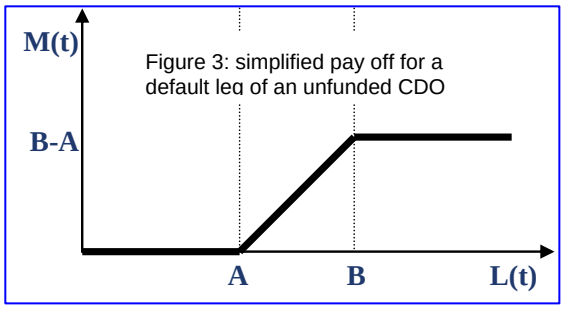


Figure 3: simplified pay off for a default leg of an unfunded CDO

g. ***Derivative CDOs instruments are built on the basis of this tranching mechanism.*** The instruments are similar to a CDS with a premium leg and a default leg and are called **"unfunded CDOs".**

As there is no structure with assets and liabilitiesthe collateral portfolio is defined as a "reference" portfolio.

In the premium leg, the protection seller receives a premium that is equivalent to the SPV note margin described in e. above.

In the default leg, the payments reproduce the tranches' terms. Figure 3 shows the payment to be made by the protection seller M(t), as a function of the accumulated losses L(t) of the "reference portfolio". We observe that when the accumulated losses are below A, no payment is required, and when they are above B, the payment is capped to the "tranche width" i.e. B-A.

We can schematize this by saying that under the unfunded format (derivative), impairment of the note is replaced with cash payments under a default leg (rather than diminishing the final redemption in the note format, the protection buyer is compensated for the loss incurred through a cash flow).

Detailed illustration of the payment mechanism is given in §11 below.

h. ***In order to fully define an unfunded synthetic CDO derivative, one needs to specify the following :***

- ***The reference portfolio*** : this is specified by the list of the selected CDS curves (remember this is synthetic),
- ***The attachment and detachment points*** (in some exotic cases, these are moving with time),
- ***The currency*** in which the payments take place, the ***premium details*** and the ***maturity***.

3 - Product specification to illustrate the study

8. In order to illustrate this study, we have chosen to deal with an *unfunded tranche of a synthetic CDO*. Since the instrument is a derivative, it needs to be accounted for at fair value with changes in fair value recognised in profit or loss according to IAS 39. As explained in the introduction this simple accounting treatment, will focus description and discussion on the key fair value measurement issues (i.e. modelling, inputs, observability,…).
9. The *reference pool* is specified as follows :
    a. The risk universe was chosen so that a CDS market exists. We opted for an *investment grade pool of 100 CDSs*[3] *(see§6 for a detailed description of a CDS)* ,
    b. We selected the CDSs so that three geographical zones are involved (§18 explains that geographical considerations are important),
    c. We opted for an equal weighting of the pool, i.e. each CDS represent 1% of the reference portfolio notional,
    d. We considered the pool as static over the lifetime of the deal,
    e. We set the reference portfolio total notional at 100M€.

[3] Example, line 18 in the table figure 4 means that the pool contains a CDS on Carrefour with a 1M€ notional with the same maturity y as the product (here 3years).

Figure 4 : reference pool specification

	RefEntity	Seniority	Region	Notional
1	Aktiebolaget Volvo		Europe	1%
2	Abbey National plc	SUBLT2	Europe	1%
3	Allianz SE	SUBLT2	Europe	1%
4	ALLIED DOMECQ LIMITED		Europe	1%
5	American Express Co		N.Amer	1%
6	Casio Computer Co Ltd		Japan	1%
7	AXA	SUBLT2	Europe	1%
8	BAA LIMITED		Europe	1%
9	BAE Systems plc		Europe	1%
10	BANCO SANTANDER S.A.	SUBLT2	Europe	1%
11	Bank of America Corporation		N.Amer	1%
12	Bank One Corp		N.Amer	1%
13	Mitsui Fudosan Co., Ltd.		Japan	1%
14	Bayerische Motoren Werke AG		Europe	1%
15	Boeing Co, The		N.Amer	1%
16	BRITISH AMERICAN TOBACCO p.l.c.		Europe	1%
17	BRITISH TELECOMMUNICATIONS public limited compai		Europe	1%
18	CARREFOUR		Europe	1%
19	AT&T Mobility LLC		N.Amer	1%
20	CIT Group Inc		N.Amer	1%
21	Citigroup Inc		N.Amer	1%
22	COMPAGNIE DE SAINT-GOBAIN		Europe	1%
23	Constellation Energy Group Inc		N.Amer	1%
24	Daimler AG		Europe	1%
25	Deutsche Bank AG	SUBLT2	Europe	1%
26	Deutsche Telekom AG		Europe	1%
27	Diageo plc		Europe	1%
28	DSG INTERNATIONAL PLC		Europe	1%
29	Dover Corp		N.Amer	1%
30	Dow Chemical Co, The		N.Amer	1%
31	Dresdner Bank AG	SUBLT2	Europe	1%
32	Koninklijke DSM NV		Europe	1%
33	Duke Energy Carolinas, LLC		N.Amer	1%
34	EI du Pont de Nemours & Co		N.Amer	1%
35	E.ON AG		Europe	1%
36	Eastman Kodak Co		N.Amer	1%
37	ELECTRICITE DE FRANCE		Europe	1%
38	Empresa Nacional de Electricidad SA		Europe	1%
39	ENEL S.P.A.		Europe	1%
40	ENI SpA		Europe	1%
41	FORD MOTOR CREDIT COMPANY LLC		N.Amer	1%
42	General Electric Capital Corp		N.Amer	1%
43	GMAC LLC		N.Amer	1%
44	Nishimatsu Construction Co Ltd		Japan	1%
45	Hewlett-Packard Company		N.Amer	1%
46	LADBROKES PLC		Europe	1%
47	HSBC Finance Corporation		N.Amer	1%
48	HSBC Holdings plc	SUBLT2	Europe	1%
49	IBERDROLA, SOCIEDAD ANONIMA		Europe	1%
50	**IMPERIAL Chem Inds Ltd**		Europe	1%
51	ING Bank NV	SUBLT2	Europe	1%
52	The Interpublic Group of Companies, Inc.		N.Amer	1%
53	INTESA SANPAOLO SPA	SUBLT2	Europe	1%
54	JP Morgan Chase & Co		N.Amer	1%
55	John Hancock Financial Services Inc		N.Amer	1%
56	Jones Apparel Group Inc		N.Amer	1%
57	Koninklijke Ahold NV		Europe	1%
58	Koninklijke Philips Electronics N.V.		Europe	1%
59	LAFARGE		Europe	1%
60	Lehman Brothers Holdings Inc		N.Amer	1%
61	Lloyds TSB Bank plc	SUBLT2	Europe	1%
62	MARKS AND SPENCER p.l.c.		Europe	1%
63	MBIA Inc		N.Amer	1%
64	FIA Card Services, National Association		N.Amer	1%
65	Merrill Lynch & Co Inc		N.Amer	1%
66	METRO AG		Europe	1%
67	Motorola Inc		N.Amer	1%
68	NATIONAL GRID ELECTRICITY TRANSMISSION PLC		Europe	1%
69	Tokyu Corp		Japan	1%
70	Nokia Oyj		Europe	1%
71	Telekom Austria AG		Europe	1%
72	Omnicom Group Inc.		N.Amer	1%
73	Pearson plc		Europe	1%
74	RENAULT		Europe	1%
75	Rolls-Royce plc		Europe	1%
76	Royal Bank of Scotland plc	SUBLT2	Europe	1%
77	RWE Aktiengesellschaft		Europe	1%
78	Unilever NV		Europe	1%
79	Scottish Power Limited		Europe	1%
80	Sempra Energy		N.Amer	1%
81	Siemens Aktiengesellschaft		Europe	1%
82	Janus Capital Group Inc		N.Amer	1%
83	STMicroelectronics N.V.		Europe	1%
84	Sun Microsystems Inc		N.Amer	1%
85	TELECOM ITALIA SPA		Europe	1%
86	TELEFONICA, S.A.		Europe	1%
87	Tesco plc		Europe	1%
88	ThyssenKrupp AG		Europe	1%
89	Acom Co Ltd		Japan	1%
90	UNICREDITO ITALIANO S PER AZIONI	SUBLT2	Europe	1%
91	Arcelor France		Europe	1%
92	UST Inc		N.Amer	1%
93	Vattenfall Aktiebolag		Europe	1%
94	Verizon Communications Inc.		N.Amer	1%
95	Visteon Corp		N.Amer	1%
96	VODAFONE GROUP PUBLIC LIMITED COMPANY		Europe	1%
97	VOLKSWAGEN AKTIENGESELLSCHAFT		Europe	1%
98	Wachovia Corp		N.Amer	1%
99	Wal-Mart Stores Inc		N.Amer	1%
100	The Walt Disney Company		N.Amer	1%

10. We consider a*n example of a transaction* between two counterparties: an INVESTOR or CLIENT (C) and a BANK (B) where the INVESTOR/CLIENT wants to create a credit risk position synthetically, that is equivalent to the mezzanine tranche of the above portfolio. In this example, the bank is the protection buyer and the investor/client the protection seller.

    a. Mezzanine means that the attachment point is below the expected loss of the pool, and the detachment point is above. We have chosen a 3%-6% tranche, based on the prevailing CDS levels at trading date (below),

    b. We consider that INVESTOR C and BANK B, agree to set the time horizon of the product at 3 years. The start date is set at 30/5/2008 and maturity date at 30/6/2011.

    c. We have set the premium leg at 100bps per annum with quarterly settlement.

11. The resulting derivative has therefore a 3M€ notional [i.e. tranche width * reference pool notional: (6%-3%)*100M€ = 3M€]. We provide below an example of pay out under a given market scenario :

    a. In a first period, no default occurs. BANK B pays periodically (each quarter) 100bp on the €3M notional (i.e. the initial notional of the tranche),

    b. We assume a default occurs at time T1 on a given name in the pool (1% of the pool) and no recovery is expected on this name.

        i. The cumulated portfolio loss at T1 is 1% (or 1M€). As this is below the attachment point of the derivative (3M€ or 3% * 100M€), INVESTOR C is not required to make any payment.

        ii. In the meantime, the reference pool notional reduces to 99M€ and BANK B is now having protection on 2M€-5M€ loss tranche on a 99M€ portfolio. The attachment point has now changed into 2M€/99M€ ~2.02% and the detachment point into 5M€/99M€~5.05%

        iii. The premium continues to be paid by BANK B on the same notional, i.e. 3M€. Note that if we apply the same calculation as above, using the updated tranche attachment/detachment points, this would give us the same result, i.e. (5.05%-2.02%) * 99M€ = 3M€

    c. We assume that at time T2, two other defaults happen. The first triggers a 0.5% loss (i.e., there is some recovery) and the second a 1% loss (no recovery).

        i. The accumulated losses at T2 amount to 2.5% or 2.5M€ (i.e. 1M€ at T1 + 1.5M€ at T2). Since the accumulated losses still are below the initial attachment point of the tranche (3%), INVESTOR C is not required to make any payment.

        ii. The reference portfolio notional stands now at 97.5 M€ and BANK B has now a protection on a 0.5M€ - 3.5M€ tranche. This means that the attachment is now 0.51% (or 0.5M€ / 97.5M€) and the detachment point is 3.59% (or 3.5M€ / 97.5M€)

        iii. The premium continues to be paid by BANK B on the same notional (i.e. 3M€), which is obtained through the following calculation (3.59%-0.51%) * 97.5M€ = 3M€,

    d. Assume a new default of 1 M€ occurs at time T3 on another item with no recovery, such that the portfolio cumulated loss stands at 3.5M€.

        i. Here, the accumulated losses exceed the tranche with initial attachment point (said differently, the new loss 1% exceeds the updated attachment point 0.51%), but are still below the detachment point,

        ii. INVESTOR C is now requested to settle a payment equivalent to the excess loss over the tranche attachment level that is 0.5M€. (0.5M€ = 3.5M€ - 3%*100M€ or equivalently 0,5M€ = 1M€ - 0.51%*97.5M€),

iii. Since the tranche starts to be affected, its notional is reduced from 3M€ to 2.5M€. The portfolio notional is now 96.5M€ and the updated attachment point is 0% while the updated detachment point is 2.5M€ / 96.5M€ ~2.59%. The tranche now is an equity tranche, meaning that any further loss will impair it.

iv. The premium continues to be paid by BANK B. However, since the tranche has been affected, its notional changes from 3M€ to 2.5M€ at time T3. Hence BANK B will be requested to make the premium payment on 3M€ up to T3, then on 2.5M€ notional from T3 onward, on an accrual basis.

e. Assume three other defaults occur, such as the accumulated losses amount to 6.5% (6.5M€ losses on the reference notional). Then, the tranche is wiped out and the transaction ceases.

4 - What does "Market" mean for this instrument ?

This section describes the context in which a product like the one specified in Section 3 "Product specification to illustrate this study" above is traded, and clarifies what is referred to when one talks about the "CDO market".

12. It is clear from the above that the pool and the features of the CDO have been customized by the BANK B, in order to match the risk appetite of the INVESTOR/CLIENT C (see motivation for investing in a CDO in the introduction of §5 above). This is described as a *"bespoke"* transaction.

13. Also, from the above developments, we understand that the transaction was made *over the counter*. In the current market state of development, such transactions are not made through brokers. But we can reasonably assume that before trading, INVESTOR C has asked several potential banks to price the same or similar product, and has chosen the transaction with the best trade-off between the risk profile and the price (i.e. amongst several offers, INVESTOR C would choose the highest premium and the closest structure to the target risk profile). Such price setting mechanism can establish a "market" for INVESTOR C or the investor.

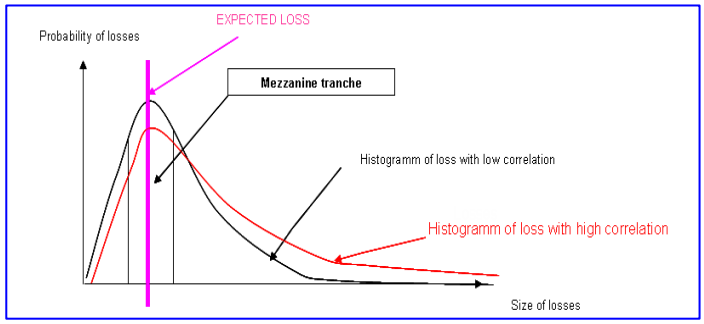
14. From the stand point of the BANK B, the reason for having entered into such a transaction has not yet been discussed. Obviously, it is less than probable that Bank B has the exact opposite risk appetite as its CLIENT C (although the risk profile can sometimes be interesting for the BANK in a context of a CDO book's risk management). And we can reasonably assume that the BANK B has "manufactured" (structured) the transaction for the needs of its CLIENT C and will expect to be remunerated not only for bearing the opposite risk, but also for this structuring service.

15. Let's now focus on the price setting mechanism (the offer made to the INVESTOR/CLIENT C) from the stand point of BANK B. It is clear that for the purpose of setting a price, BANK B will aim at looking for potential transactions, bearing opposite risk, or mitigating it. BANK B will have the choice between asking for the price of purchasing the same transaction from a competitor, or for the price of hedging instruments, or a hedging strategy. This is typically how a base price is "manufactured", to which a margin would be added for structuring the product, as well as an additional risk margin if Bank B is not totally comfortable with its choices.

16. For the purpose of setting a hedging mechanism, BANK B has several "markets" at its disposal, but needs to choose the hedging instruments and estimate the timing of their purchase as well as the quantity for each in order to offset the risk. In the particular case of a CDO, this "cost of hedging" will drive the price setting mechanism for BANK B. The notion of "Markets" turns then to be the market of the base "components" used by BANK B.

17. Determining the "components" is equivalent to having a valuation technique (or pricing model). And this will be discussed in more details below. Anticipating a bit, to facilitate the reading of this section, we add that typical components are the CDSs referenced in the pool, CDSs on index pools, and CDSs on index pool tranches for the following reasons :

    a. As BANK B is buyer of a protection on the mezzanine tranche, it pays premiums to INVESTOR C. The level of the premium is based on the creditworthiness of the pool components at the pricing date. Should the creditworthiness improve later, BANK B's exposure will decrease in value. BANK B is therefore "long" in protection on the individual names, and would need to use single name CDSs to offload the risk to the market,



    b. Assume now that the credit worthiness remains the same (probability of defaulting is unchanged over time). The amount of expected loss[4] on the pool is therefore known to BANK B. However, what is not known, is the distribution of the losses[5].

       The opposite graph represents two different situations. In one, there is a higher probability that loss size is big (defaults occurring altogether), while in the other one, there is more probability that the loss size is low (the defaults occur separately).

[4] Loss expectation for the pool has to be understood in terms of probability. Let's take the example of a pool composed of two assets worth 10M€ each and asset 1 has 50% default probability while asset 2 has 60% of default probability. The loss expectation is therefore 10M€ *50% + 0M€* 50% + 10M€*60% + 0M€ *40% = 11M€. [See glossary 9]

[5] In order to understand what a loss distribution of a portfolio is, let's take the example of our pool of 2 assets in previous footnote. We have to assign probabilities to all the events : 1) asset #1 defaults while #2 survives 2) both assets default 3) both asset survive 4) asset #2 defaults while #1 survives. This is of course driven by correlation of default, with the restriction that the total loss expectation remains 11M€. if the assets are independent, a simple probability tree gives the probability weights 1) 20%, 2) 30% , 3) 20% and 4) 30%.. If the correlation is different, the probability weights are different. Here we can observe that with a given loss expectation, a tranche that is only sensitive to event 2) is sensitive to the distribution.

BANK B, for a given and known probability of default of individual names, is therefore exposed to another type of risk : the correlation of default times. If default events have tendency to occur at the same time, high losses get more probable, and vice versa[6]. Accordingly, BANK B will need to price the cost of re-insuring such risk. This can be achieved through several possibilities :

- BANK B can simply bear the correlation risk exposing itself to an adverse change in correlation regime. Of course, in this case, BANK B would charge part of the potential loss to INVESTOR C as compensation. A disadvantage of such a choice is that the price will be less competitive.
- BANK B can sell to two other Counterparties the remaining pieces of the capital structure (referred herein as a capital structure reconstruction technique), i.e. the 0-3% and the 6-100% tranches. If it succeeds, the resulting exposure is a full exposure on each name of the total pool (i.e. equivalent to buying protection on the total pool). Then, all that BANK B needs to do is to sell protection on each name of the total pool, therefore completing the hedge. Reconstruction of the capital structure is a perfect static hedge. And if a bank B is able to implement it, the pricing of the transaction with INVESTOR C is likely to be very competitive compared to peers. In practice, this is however hardly achievable. Indeed, BANK B needs to find two Counterparties interested in the same pools as INVESTOR C, which is far from obvious knowing that the product was manufactured specifically for INVESTOR C.
- BANK B can buy an exposure to the mezzanine tranche of another pool. As such products are rather rare; it is very likely that the Bank opts for using the index tranches as a hedge. The resulting position is imbalanced (imperfect hedge). If this solution is retained, BANK B will be looking at estimating the cost associated with hedge efficiency, when setting a price. Like in the first situation, the price will be less competitive.

18. Let's now have a better understanding of where BANK B can source (find and trade) the components of its hedging strategy. Here, it is interesting to observe that the market conditions have changed over the last years, with several segments appearing and disappearing.

    a. Up to 2004, the only market component available to BANK B would have been the CDS market. Hence, the only choice for BANK B would have been to bear the correlation risk.

       It is interesting to observe that most market participants like BANK B have accumulated correlation risk during this period (buyers of mezzanine protection), and could hardly offload it through a reconstruction of the capital structure.

[6] One can think about this phenomenon by observing that the sum of the value of all the tranches is known once the CDS prices are known, but the distribution of this value varies across the tranches : CDOs behave as a "capped toothpaste which is squeezed".

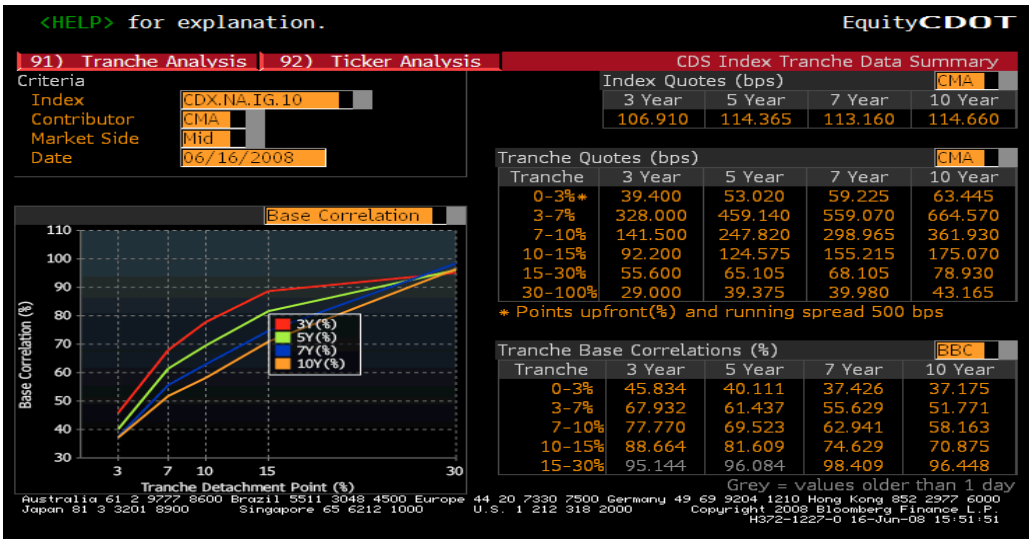
It is also interesting to observe that during this period, the demand for mezzanine tranches has pushed market players to be aggressive in the pricing, hence pushing mezzanine protection premiums to high levels.

b. Mid 2005, market troubles in the automotive industry have led to a repricing of the mezzanine tranches. Indeed, observing that some significant credit events could occur without obeying any correlation assumptions, market participants were shifting more value from mezzanine to Equity tranches (see above §17), leaving BANK B-style participants with big losses as the mark to market of mezzanine tranches held by those market participants was decreasing whereas the mark to market of the equity tranches was increasing. This crisis made all the participants aware about the necessity of hedging the correlation exposure, and led to a massive switch from in-house hedging models based on CDSs to new hedging schemes based on indexes.

c. This switch was possible since, before and during the 2005 crisis, a very liquid market of index-based instruments (including credit index tranches) emerged. The liquidity of this market has made the index-based CDSs and tranches instruments a very serious "candidate" for building portfolio hedges and arbitrage strategies, which further increased their liquidity.

Today, a liquid index markets exist with a broad array of underlyings. One can find indices referencing investment grade or high yield underlyings but also indices of broader type such as crossover index, geographical or sector indices. Indices can be thought of as the "reference portfolios"; and what is quoted and traded are tranches of these portfolios with different seniorities, for maturities including 3 years, 5 years, 7 years and 10 years, as well as for investments in Europe, the US, Japan and non-Japan Asia. As shown in the graph below, indexes are publicly available on screens.

Two indices concentrate most of market liquidity : the iTraxx (European investment grade corporates), and the CDX (US investment grade corporates). Each of these indices can be used to hedge correlation risk within the relevant geographical zone.



d. Concomitantly to the development of the index tranche market, market participants massively invested in the capital structure reconstruction technique :

- Firstly, they enlarged the product offer through more sophistication in bespoke CDO products, in order to sell the Senior and Junior parts of the capital structure.

  An example of such a development was the heavy marketing of Leveraged Super Senior Swap, in order to enhance the yield of the less risky senior part and attract investors. And, in the other part of the spectrum, the Junior risks were structured in the form of principal protected junior tranches or zero coupon junior tranches, in order to limit the risk of the Equity part.

- Secondly, they enlarged their client base in order to find all market participant styles : hedge funds, arbitrage desks, yield-hungry investors, risk adverse ones, market making desks…

The relative success of market participants in implementing the "capital structure reconstruction" strategy created a difference between those participants with a strong client flow and diversity and those who have weaker setup.

e. During the period 2005-2006, trading between banks (BANK B-style Counterparties) has also increased. And some inter-dealers trading in "standardised bespoke" tranches was observed at that time. The liquidity of such baskets is not comparable to index tranches. However, they introduced a way to hedge specific exposures not captured in the indexes, such as inter-geographical correlation[7].

19. In the light of the above, the reader can easily understand that the concept of "market" for bespoke CDOs is complex and highly dependent of the point of view of the market participants. If we define a "market" as the existence of offers and demands in the same instrument, and liquidity as the regular availability of bids and offers, then, no market and no liquidity exists for bespoke CDOs as such instruments are unique. By way of consequence, determining a fair value for bespoke CDOs requires the use of models, which we discuss in details in the sections below.

20. Additionally, we observed in the recent period, that part of the above "markets" disappeared or got disrupted / dislocated. This trend started with the loss of confidence of investors towards credit products, hence drying up the ability of BANK B-style Counterparties to offload the risk. It is now spreading to the index tranches market, where fears of higher systemic risk has lead to an opposite repricing of correlation risk, with more value shifted back to the super senior tranches.

5 - What modelling technique can be used to price the product ?

[7] As mentioned in §18c, the liquid indices contain information about correlation between European names and correlation between US names. These information are not enough for CDO tranche referencing both European and US names, as a cross geography correlation is needed.

Choice of valuation technique

21. There is a large variety of models that can be used to price CDO tranches. The choice of the modelling technique is generally driven by the answer to the questions : "what are the risk factors inherent to the product ?". This is a key question as it will determine the "drivers" of the product price, and help determining the most appropriate hedging technique. The answer is a matter of judgment.

22. Usually, a model becomes successful among market players when it provides accurate hedging strategies and stable hedging parameters and when publicity / disclosure are made about it.

    The choice is therefore a trade off between several considerations :

    - Are the assumptions economically reasonable ?
    - Are the instruments that drive the price available as hedging instruments ?
    - Is the model widely used (likely to be used by other participants) ?
    - Is the hedging strategy under this model leading to abnormal losses or gains ?
    - Are the number and sensitivity to entity specific inputs reasonable ?
    - Does the model reproduce prices when those are observed ?
    - …

23. Let's concentrate on our CDO example and attempt to determine its inherent risk factors[8] . In addition to the interest rates, we believe that the pricing of a CDO should take into consideration the following :

    - the credit spreads of each name (which embeds information about the default probability of each name),
    - the level of recovery of each name (recovery risk),
    - the index spread level or index skew [see glossary 5],
    - the joint behaviour of the default events (correlation risk associated with the bespoke pool),
    - the prices of index tranches (or the index correlation skew [see glossary 6]).

24. As indicated in the discussion in Section 4 "What does market mean for these products" above, the key element of the pricing of CDOs lies in the new risk class it introduces compared to single name CDSs, i.e. the co-dependency of default times of a pool of names (so called "default time correlation"). We discuss this aspect in details in the following paragraphs.

[8] The factors to be taken into account are a matter of judgment

25. *The best known and used technique for modelling default time correlation is the one factor Gaussian copula model (or Default Time Model) commonly called "Base Correlation" model*. It is important to note that such a model embeds some assumptions that are commonly used and others that are entity specific. Assumptions that are commonly used are for example :

    a. How a default event occurs in the model.

    Here a common assumption is that the binary event (default / survival) is triggered by the realizations of a continuous (normally distributed) variable. Such an assumption is simply a mathematical tool that eases the description of correlation between default times (see glossary about correlation to see why normal distributions are needed).

    b. How the joint behaviour of defaults is described.

    Here, the common assumption is to use the most intuitive form of correlation (hence the Gaussian terminology [see glossary 7]).

    With such choice, the correlation required as input is a matrix (i.e. pair-wise correlations). In order to further reduce the complexity, another common assumption is to add constraints on the form of the correlation matrix reducing the degrees of freedom. Hence the one factor terminology.

    Finally, all that is required to price a tranche with a given maturity, is resumed into one scalar : the base correlation (when dealing with various tranches, this is a curve, and there are as many curves as maturities).

26. Once the base correlation framework has been chosen (the "mathematical shapes" determined), the model user has to assign values to the parameters it involves and in particular the correlation input. With our example, user of the base correlation model needs to determine what is called "base correlation curve". This curve is specific to the underlying CDO pool, it gives the correlation level to be used for the maturity of the CDO (in our case 3 years). The problem is that since no market exists for tranches referencing our exact pool, there is no obvious way to derive exactly the base correlation curves for our CDO. This is why a market participant would use a corroboration technique, which consists in building base correlation curves from the ones observed in the market, i.e. the index base correlation curves. This technique is called "rescaling" (see example below).

27. Finally, once the choices above made, a pricing step is required. Pricing is about computing the expected discounted pay-out. In this last step, some additional numerical choices need to be made, like running a "Monte Carlo" [see glossary 8] or using "Semi Analytical Formula".

28. Before giving an example, let's mention another important modelling choice relating to the recovery assumption. Recovery has always been considered as an assumption of less importance in CDS and CDO modelling, and the most natural choice is to have a constant recovery level for each name (hence the recovery was seen as an input). Until recently, there was a general consensus on the level of recovery (40%, except for some high yield names). However, in recent periods, this assumption has been controversial and market participants now believe that the recovery is not a constant, but is a random variable that decreases when systemic risk increases and vice versa.

    This lack of consensus on the recovery modelling led to some dislocation in the index tranche market in early 2008, and led market participants to review their assumptions. For the sake of simplicity, we will stick to the historical assumptions of a fixed recovery, keeping in mind that this bears a non negligible model risk.

29. Example of pricing (see also figure 6 for a summary of the steps)

    a. The first issue to deal with, before pricing a bespoke CDO, is to "map" it into a traded CDO (typically an index). We can think about mapping in terms of "similarity". The mapping is commonly carried out according to two criteria :

        - type of references that make up the basket (investment grade or high yield),
        - and geographical situation (US, Europe or Asia)

        In the example taken for this study, the mapping exercise means that we look at the composition of the CDO and determine which indices are the most similar to it. Looking at the reference pool, we see that none of the traded indices is similar, because none contains several geographical regions . Then one idea is to consider that the pool is composed of two sub-pools, one with US names, and one with European names.

        One would then consider that the US sub-pool is similar to the CDX index, and the European sub-pool similar to the iTraxx index.The natural idea is then to try to use the correlation information contained in these index prices, in the valuation of the example CDO.

    b. The second issue to deal with is the determination of the base correlation curves of the indexes retained in the previous step (calibration).

        Index tranches are priced in spreads, while the base correlation model requires correlation between default times. This step consists in determining the correlation level that recovers market prices of traded tranches. In the base correlation screen displayed earlier in the paper, the reader can see that the prices for each maturity (3 years, 5 years, 7 years and 10 years) can be converted into a correlation level directly, depending on the detachment point.

    c. Once the above completed, we end up with two index base correlation curves (one for US index and one for the European one). But what is needed in practice is a correlation curve for the bespoke portfolio. This is the most critical step in the pricing : how to infer the second from the two first. Here entity specific "rescaling" techniques are usually used by market participants, and such techniques involve :

        - Assumptions that can be back-tested with the few available indications, such as consensus pricing services [see glossary 10].

- Other assumptions that can be corroborated with statistical analysis (examples of observation of the link between the movement of tranche spreads and the movement of correlation provide valuable information),
- Other fully entity specific assumptions whose validity can be based only on judgment and risk management behaviour (stability of risks, efficiency of the hedging strategy…).

d. The final step is to chose the pricing configuration between the available numerical techniques. Monte carlo simulations, being a natural choice, but not the only one available (see §27)

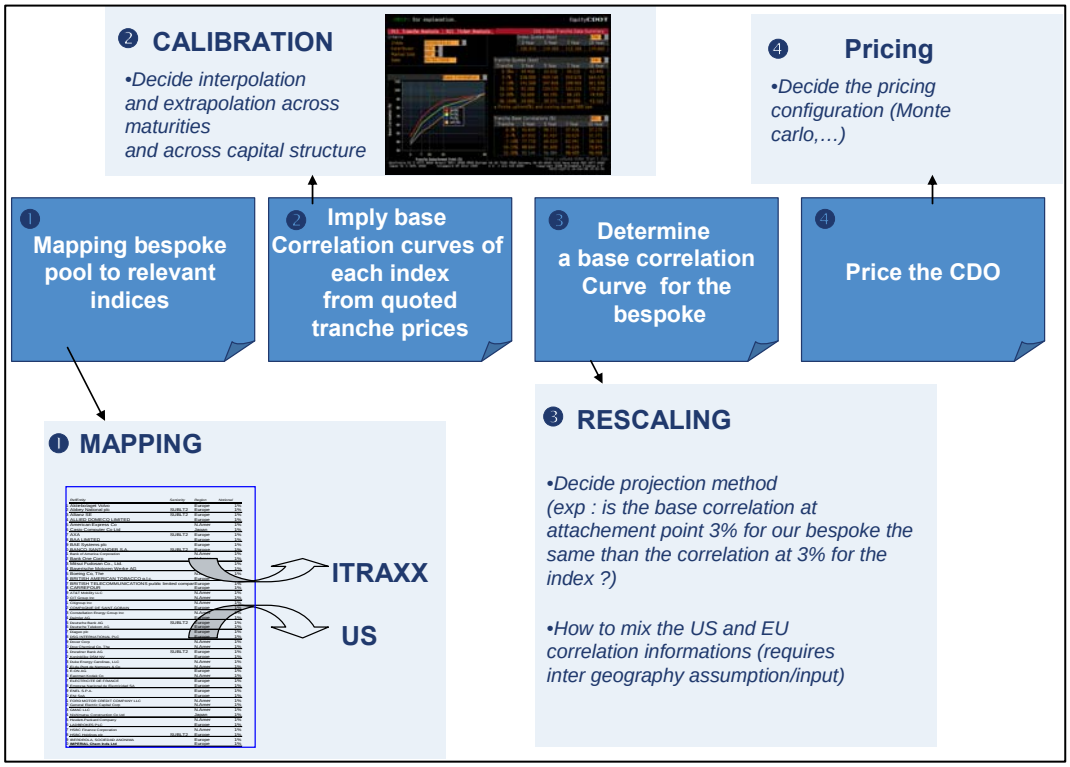


Figure 6 : example of pricing steps for a synthetic CDO

Here we deal only with the core part of the model which is the determination of the correlation curve.

Inputs to the valuation technique

30. The CDO modelling technique and the choice of inputs are closely linked and even inseparable. As explained in the “market” section above, the model is about the choice of the hedging strategy, and the market prices of hedging instruments are naturally the inputs to the valuation technique.

31. Being natural hedging instruments, the prices of the following instruments are therefore inputs to the model :

    a. The CDSs (components of the reference portfolio),

    b. The index CDSs and index tranches.

32. Once we obtain the prices of hedging instruments, we need to fix values for internal model parameters. These values cannot be calibrated (implied) from the hedge instrument prices. They need to be specified using alternative techniques.

    a. Statistical analysis if applicable,

    b. Any other corroboration technique (proxies).

    The choice between these two techniques is far from obvious, and privileging one or the other is a matter of judgement involving a variety of considerations.

33. The following table displays the inputs that are necessary to perform a CDO’s pricing. For each component, we mention the level of observability and the sources where information can be found.

Input to the valuation technique	Observability assessment	Observability potential issues
CDS prices (Spread curves)	Liquidity depends on the name Mainly observable (and available in Mark-it market consensus service)	Some names might display less liquidity, or be non tradable. This can occur if the underlying name encounters troubles, of simply there is no or little bond activity.
Recovery rates	Partially observable : Recovery rate can be obtained from CDSs traded with up front payments, or through recovery swaps. However, these are rather rare instruments and are not available for the entire portfolio. However, recovery rates read directly as a fixed input in the Mark-it market consensus service.	Lack of consensus over recovery modelling generates uncertainty on the equivalent amount of fixed recovery. In current crisis, recovery assumptions range from 20% to 40%, reflecting the fears of market participants that recovery is lower in systemic risk context.
Index tranche prices (Index base correlation curves)	Observable through broker pages (see screen print)	Index tranche quote might display illiquidity, and dislocation. Liquidity can lead to arbitrage situations whereby the sum of the tranches does not match the index CDS level (dislocation when reconstructing the index pool capital structure). In such situations, the base correlation model cannot be calibrated. And although index tranche prices are observed and tradable, one can hardly say that the implied base correlation curves are observable. Index tranche prices are available and traded actively for a short period of time, i.e. for the so-called on-the-run indices (indeed the index pool composition is rolled and updated every 6 months)
Model parameters (Extrapolation parameters, cross correlation parameters, rescaling technique parameterisation)	Generally, these are entity specific parameters. However : * There are some possibilities to back-test these values using market consensus pricing services. * Depending on the bespoke tranche, the sensitivity to the model parameters may be more or less material to the value. * In a book context, different bespoke pools can create opposite sensitivities to the model parameters. Hence, an entity with a well balanced book can get to a risk position where the sum of values is non materially sensitive to the model parameters.	In an ideal world, model parameters are determined so that the model remains consistent with the available price indications and with other observations (corroboration techniques). However : i/ consistency is generally not achieved for all the back-testing reference pools, and ii/ back-testing is not always available for similar structures. Hence, observability of these parameters has to be assessed on a case by case basis, and can disappear at some times according to the availability of the back-testing references (e.g., if the bespoke CDO is similar to the index at one given time, but is no longer similar when the index is rolled).

34. Traded / observable parameters : Most of CDS prices in our example (see figure 4, reference pool) are actively traded on broker markets. As long as the entity is an active participant in CDO products, such parameters can be obtained easily on a daily basis. This is mostly the case for Bespoke CDOs : underlying CDS are actively traded and there is relatively little uncertainty about spread levels.

a. It could happen that a market disruption appears in the CDS market for a given name. In such cases, a usual method would be to map the name to a similar CDS curve. Choice of the curve would be driven by historical analysis and observations.

b. It could also happen, as seen in the recent periods, that the index tranche market displays some dislocation. This happens in two situations :

- The appearance of unusual arbitrage opportunities between the index and its components. There is no obvious response in this case, as this is a pure model risk that can be accommodated by a valuation adjustment,
- The appearance of arbitrage opportunities between index tranches (sum not equal to the index, implied base correlation higher than 100%, etc.). In this case, market participants may change the model, or the recovery rate.

35. Non traded / non observable parameters

Model parameters

a. Although non-traded directly, the model parameters can be implied, or fitted to a set of observed prices. Furthermore, a dealer with a portfolio of CDOs may have little or no sensitivity to some of these parameters (or associated model choices) thanks to risk offsetting.

b. The most common practice is to set the value of the parameters (say the rescaling parameter) to a value that makes sense economically. For example, one can observe historically the joint behaviour of the index base correlation curve and the expected loss of the index. This gives valuable information on the rescaling scheme/factor. This being done, the value of the parameter is regularly back-tested to one or all of the following :

- Repricing of the off-the-run index which are still liquid,
- Repricing of Mark-it baskets (a large panel of bespoke pools exist spanning small and large pools, all geographies and a large band of expected losses),
- Repricing of inter-dealer bespoke baskets where available,
- Repricing of Mark-it “tranchelets” (back-testing of extrapolation hypothesis).

Combination of the historical analysis, back-testing analysis, and the risk offsetting across the traded instruments, provide an extensive panel of observation alternatives. Still, the observations are highly dependent on the depth of the analyses and the expertise of each participant.

The recovery

a. As explained above, the recovery modelling is becoming a hot topic for CDO modelling in the current market context. There are indeed few elements of back-testing for this parameter, whose value used to be a wide consensus.

b. Recovery uncertainty is generally addressed through valuation adjustments.

PART 2 – FAIR VALUE ACCOUNTING ISSUES

6 - Introduction

36. The second part of this paper summarises the main accounting issues raised by the valuation at fair value of the bespoke CDO described in the first part. The working group has decided to focus on the accounting issues arising after the initial recognition of the instrument. For this reason, the paper deliberately does not elaborate on the notion of day-one-margin (see § 40 and § 41) whose analysis would have deserved extensive developments.

37. The application of the existing accounting requirements in IAS 39 to this specific product raises practical issues for which further guidance may be necessary. The practical valuation issues are identified by the boxes following the discussion on the application of the accounting provisions to the illustrative example.

38. The main accounting issues developed hereafter are as follows :

- Section 1- Initial pricing of the instrument - gives some details on the pricing of the bespoke CDO when it is sold.

- Section 2- Existence and characteristics of an active market- discusses whether it is possible to identify an active market for this specific product. This section considers in particular the concept of "market" for an illiquid instrument and concludes that the product cannot be deemed to be traded on an active market.

- Section 3- Choice of a valuation technique- addresses how to justify the choice of a valuation technique such as quoted prices related to similar instruments or a model-based valuation technique.

- Section 4- Choice of a valuation model- discusses how to justify the choice of a valuation model and assess that it is "commonly used". Questions are raised principally on the definitions of a "common" model as models usually include entity-specific specifications.

- Section 5- Choice of inputs and possible model adjustments- elaborates on which inputs should be used for the model or on the contrary disregarded and whether model adjustments are permitted. Questions are raised on the meaning of a "market input". The lack of guidance on the back-testing process for an illiquid product and on required valuation adjustments is also underlined.

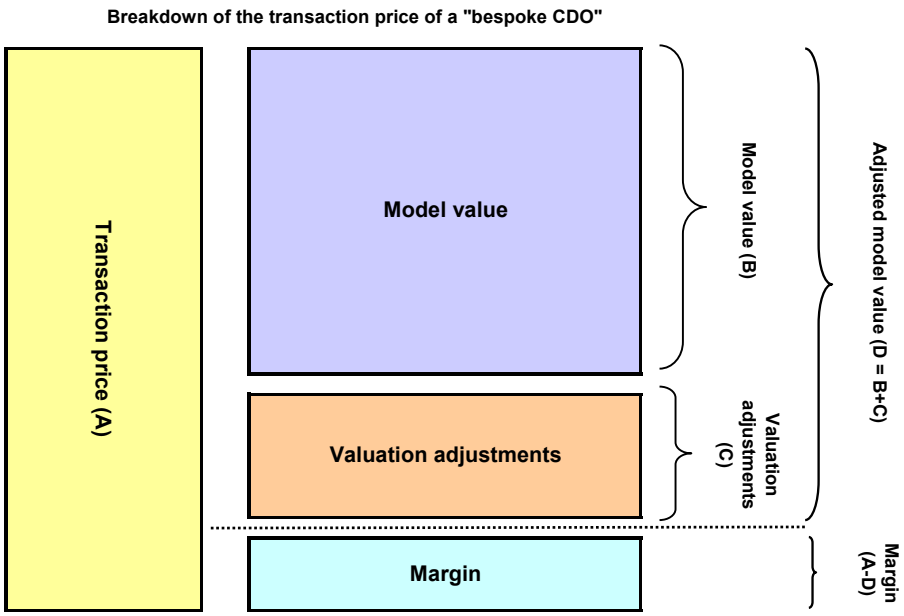
- Section 6- Issues arising when inputs become unobservable- considers the impacts of the disappearance of observable inputs (in particular the new information sources to be retained and effects on the valuation technique). Criteria allowing to disregard available quoted prices are discussed. The necessity to obtain more details on the notion of "forced sales" or "distressed sales" is raised.

7 - Initial pricing of the instrument

39. In practice, the transaction price of a bespoke CDO, as described in the part 1 of this paper, is determined between the two counterparties (the bank and the investor). As described in paragraphs §15 and §16 of the paper, the formation of this price relies on two components :

    a. the adjusted model value which encompasses valuation adjustments necessary to mitigate uncertainties on non observable inputs (mostly model parameters) or on risks imperfectly treated by the model (counterparty or liquidity risk) and, additonally, to take into account the imperfections of the model itself

    b. the initial margin (named Day one Profit in accounting literature) which remunerates particularly the know-how of the bank.



40. The “margin” can be described as the difference between the transaction price of the instrument (A) and the adjusted model value (D). In our example the adjusted model value of the instrument depends on the cost of hedging (the model value in the above-mentioned illustration, see also §16.) plus an adjustement (C) for non “hedgeable” risks, or risks imperfectly taken into account by the model. One must keep in mind that the margin is however not certain since its realisation and its timing over the life of the instrument can evolve if the valuation adjustments made at the inception of the deal are no longer adequate and need to be reassessed due to the fact that different factors were not correctly anticipated at the transaction date.

41. According to IAS 39 the recognition in profit or loss at inception of this margin is possible only if "*the fair value of that instrument is evidenced by comparison with other observable current market transactions in the same instrument or based on valuation technique whose variables include data from observable markets" (AG 76).* On the contrary, the application of FAS 157 implies that for certain financial instruments, such as derivatives, any difference between the transaction price and the fair value should be recognised in profit or loss at inception.

42. When considering the fair value measurement project, and its potential impact on IAS 39, it should be decided if on initial recognition the financial instruments should be measured at "exit price" (in which case the definition of this notion should be clarified) or at transaction price, or, as currently, at "exit price" unless the instrument or the data used to price the instrument are not observable on the market, in which case the transaction price would prevail.

8 - Existence and characteristics of an active market for the instrument described in the first part of the paper

43. IFRSs define fair value as an exchange value between knowledgeable and willing parties in an arm's length transaction. IAS 39 states that the best evidence of fair value is a quoted price in an active market and must be used when available. It is possible to disregard market inputs in only two instances : in the case of forced transactions or distressed sales.

44. A market is considered to be active under IAS 39 (paragraph AG71) if "***quoted prices*** *are readily and regularly available from an exchange, dealer, broker, industry group, pricing service or regulatory agency,* ***and those prices represent actual and regularly occurring market transactions on an arm's length basis…at the balance sheet date***". To be considered as active, a market must comply with three conditions : i) there must be regularly available quotes at the closing date, ii) these quotes must be representative of actual transactions, and iii) only transactions on "arm's length basis" are taken into consideration, forced or distressed sales being assumed not to reflect a fair value exchange. In the case of complex financial instruments these criteria might be challenging since there are generally few actual transactions and the markets where these products are potentially traded are by essence illiquid.

45. Moreover the definition of an active market in IAS 39 is described in very general terms and the standard does not give any technical guidance on the relevant criteria for determining whether a market can be considered active (size of the market, number of deals, liquidity) or not. The status of a market is therefore essentially a matter of judgement. For instance a question arises on whether quotes provided by dealers but that are not binding or necessarily representative of real transactions should be considered to stand for fair value. More precisely, the compliance of pricing services provided by certain banks with the definition of an active market given in AG 71 is not obvious since these services are mainly designed to give an information to the customers on the price of the products sold by the bank but are not representative of an engagement to deal at that price.

46. Thus, the onus to provide persuasive evidence that there are no regular transactions occurring or that a transaction is a forced or a distressed sale is on the preparers. For this reason, the methods used to describe and to determine whether the market considered for the instrument is liquid or not should be thoroughly described in an accounting policy. Decisions taken on different categories of instruments should also be properly documented.

47. As mentioned in Part One of the paper (§19), the concept of "market" for bespoke CDOs is complex and highly dependent of the point of view of the market participants. In our example, the bespoke CDO is a structured product whose characteristics are mostly unique and we can assume that there will be hardly any public quotations on the same instrument. If a "market" is defined by the existence of offers and demands in the same instrument, and liquidity as the regular availability of bids and offers, then, the existence of an active market and of liquidity for bespoke CDOs is questionable. Also, in the case of bespoke CDOs, the assessment of the existence of an active market might be different depending from whose perspective the question is analysed (banking institution vs. investor), given the lack of access for certain counterparties/investors to specific markets or certain ranges of data.

Accounting issues n°1

- How to determine the existence of an active market ?
- In particular, which criteria should be used to demonstrate that quotes are available on an active market ? (for instance CESR criteria[9] ?),
- How investors that do not have access to the market where the instrument is potentially traded should measure the instrument ?

[9] CESR criteria : volume and turnover, issue size, independent analysis of the bid and offer prices over a period that may indicate the relative liquidity and marketability of the instrument, as may the comparability of available prices, assessing the quality of the secondary market activity (quality and number of intermediaries, volume) ……

9 - Choice of the valuation technique

48. According to IAS 39, if a quoted price on an active market is inexistent for the instrument in its entirety, as it is usually the case for a complex instrument, the entity must use a valuation technique (IAS 39 paragraph AG 74). Different valuation techniques are listed in IAS 39 paragraph AG 74 : *"recent arm's length market transactions between knowledgeable, willing parties, if available, reference to the current fair value of another instrument that is substantially the same, discounted cash flow analysis and option pricing models."* IAS 39 paragraph AG75 states that the objective of a valuation technique is *"to establish what the transaction price would have been on the measurement date in an arm's length exchange"*.

49. IAS 39 does not give explicit guidance on the choice of the valuation techniques in the absence of public quotes when plural valuation techniques exist. The standard gives examples of valuation techniques but does not indicate clearly if the choice of one of those techniques must comply with an implicit hierarchy. When an entity needs to measure the fair value of an illiquid instrument such as a bespoke CDO, it is unclear whether it should preferably select a similar instrument, for which there are observable transactions on the market and adjust its price for any difference that exist between the two instruments, or if it should use a model that incorporates market based data. For instance, if a CDO whose underlying risk profile (names and attachment points) perfectly match the characteristics of a liquid index, it is quite obvious that the valuation of such a financial instrument should be directly derived from the index market for the purpose of simplicity. However, in practice, a perfect match between a bespoke product and an index is highly unlikely, but situations could occur in which it is possible to obtain a fair value both from similar products or from an in-house model backed on market indexes.

50. The choice between these two options is crucial since a trade-off must be made between two potentially conflicting objectives : i) the desire to rely on public data reflecting exchanges between market participants and ii) the desire to take into account all the specificities of the product. The final decision is clearly a matter of judgment. But other considerations like the level of sophistication of the preparer can have an influence. It is clear that the level of information on complex financial products will not be the same for all the participants. For instance, it seems reasonable to assume that a corporate will have a very limited knowledge of the valuation techniques used by sophisticated banking institutions for fair valuing their investment. For instance market participants who do not have access to alternative valuation techniques will have no choice but to use external references, even if not totally satisfactory, or to rely on estimates provided by the banking organisation which sold them the CDO. Indeed, before the outbreak of the crisis, a certain number of "non sophisticated" market participants used to rely on quotes on primary market transactions for similar instruments.

51. Additionally, we note that IAS 39 does not provide any guidance on the criteria to allow an entity to consider two instruments as similar in substance as well as on the adjustments that are needed and acceptable.

52. When looking for a similar instrument on a secondary market to value the bespoke CDO taken as an example, the best proxy seems to be the CDS indexes as mentioned in §18.c). A liquid market exists for a broad range of indexes with various underlying assets. Similarities between both types of products might be assessed through the nature of the underlying basket (a comparable reference pool of CDS in terms of names, sectors and geographic concentration), the level of seniority of the tranches, the attachment and detachment points and maturities. However due to the particularities of the bespoke CDO, there are no CDS index tranches that appear to be directly comparable to the CDO. Therefore, in the absence of a quoted transaction price for an instrument whose observed differences can be easily and rapidly adjusted, the recourse to a model based valuation is the most common method within the financial industry, as mentioned above in Section 5 §21 to §28. in particular due to the complexity and specificity of the product.

Accounting issues n°2

- Is there in IFRSs an implicit hierarchy between the different valuation techniques that are available (i.e. similar instruments, in-house models, other…) ?

For instance :

- Should an entity favour the use of similar instruments/market of indexes as opposed to the use of a valuation model when they need to value an illiquid instrument with highly specific characteristics ?
- Should preparers, in the absence of quotes on similar instruments, refer to quoted instruments, whose characteristics are somewhat different, or rely on model based valuation that take into account all the specificities of the product ?

- What are the appropriate criteria in order to assess whether two instruments are comparable in substance ?

10 - Choice of a valuation model

53. IAS 39 paragraph AG74 states “if there is a valuation technique commonly used by market participants to price the instrument and that technique has been demonstrated to provide reliable estimates of prices obtained in actual market transactions, the entity uses that technique.” The application of the standard raises questions on whether the model is i) widely used by other market participants and ii) whether it could generate a reliable estimate of prices observed on a regular basis in actual market transactions. The second condition is of importance to get assurance that the process of fair valuation is not a pure hypothetical exercise.

54. From a banking institution standpoint, the choice of a model is closely linked to its hedging strategy. Therefore, in practice the valuation of bespoke CDO derived from

models is more a "value in use" price than an "value in exchange" since the cost of hedging which constitutes the most important part of the price is determined on a portfolio basis through a risk management strategy. The monitoring of risks and the choice of the hedging instruments being managed together on a portfolio basis, the valuation process is actually consistent with the way the instrument is managed in practice and with the context in which the bank is operating (access to markets, size of the portfolio, ..). It is probably different from the valuation process of a CDO held by an investor which will probably be fair valued on a stand alone basis.

55. In practice, banking institutions tend to select models based on the most- known and used technique that would reproduce prices when those can be observed. In the case of the bespoke CDO described in the first part of the paper, the 1 factor Gaussian copula model is selected by the bank to estimate the default time correlation[10] of the names included in the basket as it is a commonly used "base correlation" model. In the first part of the paper examples are given of some risk factors which are taken into consideration to develop a bespoke CDO model (see §23.).

56. In order to appreciate whether the valuation model used is consistent with the economic methodology generally accepted by other market participants for pricing the instrument, the bank needs to have a good knowledge and a deep understanding of other market participants' practices. Large banking institutions, which benefit from important human and technical resources, have generally developed strong in house skills, but, since the quality of models constitutes a key success factor in certain business lines, the collection of technical information on the most sensitive aspects of the valuation techniques of their competitors could turn out to be difficult.

57. Indeed, even if all banking organisations use a common methodology, the technical characteristics of a particular valuation model depend for a large part on the level of sophistication and of the position of the institution which has developed it.

58. On the basis of the current IAS 39 requirements, an internal model might not be acceptable for accounting purposes if there is no market consensus on the model (paragraph AG74 of IAS 39). In these circumstances, a financial institution could finally be obliged to use two separate models. The use of different models within a banking institution for the purpose of risk management and financial reporting might not be advisable and could cause confusion. This would also imply a disconnection between the cash flows generated by the instrument and its fair value reported in the financial statements. Regarding the hedging strategy there is a risk of developing conflicting hedging strategies, either a risk management strategy or a hedging strategy for accounting purposes. Also, we note that the requirement to use of a single model by all of the market participants might not encourage developing more adequate models to value a product.

59. Accordingly, in practice, the choice of a valuation model is based on the combination of a common valuation technique depending particularly on the nature of data that can be observed in the market place and of proprietary adaptations and assumptions. This situation can be compared to those of industrial products. For instance, in automotive

[10] One of the key element of the pricing of a CDO

industry car makers use a common base of standardized components which undergo specific adaptations for each type of vehicles through different assembly process.

60. Since the conception of a model relies on a mix of "generally accepted principles" and "in house" add-ons, there is no assurance that models developed among participants will grant comparable and consistent valuations on the market. As a consequence, a certain level of inconsistency seems unavoidable among market participants even if they share common valuation techniques for the same product.

Accounting issues n° 3

- What does a valuation technique "commonly used" by market participants" mean ? In particular, by which means should the notion of "commonality" be assessed in particular in very thin/immature markets, where the number of market participants is very limited and there is very little market consensus on the way to fair value instruments ?
- Does the wording of AG 74 mean that a bank could in the last resort be obliged to use two separate models for its internal risk management on the one hand, and for financial reporting on the other hand ?
- If the response to the precedent question is "yes", would this lead to inconsistency between the accounting position and the way the banks are actually managing and hedging their risks ?

61. In some cases, there is no commonly used valuation technique at all as the product is specifically designed to answer a particular investor need. It is also questionable how the valuation technique should be chosen in the case of entities that are in a position of "first entrants" on a new market or for a new product. The absence of common valuation technique makes the assessment of the fair value calculated by these models difficult (that should in any case approximate the price that would be obtained under actual market transactions in order to be considered for accounting purposes).

62. In the same vein, when a complex financial instrument is unique, it will be particularly difficult to comply with AG76A which states that *"Periodically, an entity calibrates the valuation technique and tests it for validity using prices from any observable current market transaction* ***in the same instrument*** *(i.e. without modification or repackaging)"*.This price testing process should also capture current market conditions.

Accounting issues n°4

- In the specific case of new products where there is no shared modelling technique and, by essence, no consensus on the market, which model should be retained?
- In case of change in a valuation technique, especially when new markets develop or new information becomes available, should there be a market consensus on this new valuation technique. More precisely :
  - How should the valuation technique be selected in the case of entities which are in a position of "first entrants" on new markets?
  - When a more sophisticated model is developed following research work that seems more adequate to value a product, is it possible to use it for accounting purposes although other market participants do not use it yet?

11 - The choice of inputs

Following the choice of a valuation technique that should be documented, inputs to the valuation technique should be defined.

- According to IAS 39, the valuation technique should rely "***on a maximum of market inputs and as little as possible on entity-specific inputs***" (paragraph AG 75). When using a modelling technique, entities are supposed to use primarily inputs that are "observable" in markets and can make use of unobservable inputs, only in the absence of the former. Further, based on the same paragraph, a valuation technique is required to give a *reasonable* value of the price that would be obtained under current market conditions. The valuation technique "***incorporates all factors that market participants would consider in setting a price"*** (paragraph AG 76). Consequently the choice of inputs calls inevitably for judgments.
- A list of inputs to the valuation technique of the bespoke CDO is given in the table in §33.Index tranches prices and CDS prices have been considered until recently as observable inputs. Recovery rates are, for their part, largely based on a general consensus between market participants (40% until recently, except for some High Yield names as mentioned in paragraph §33). They are available through market consensus services such as Mark-it.

The following paragraphs bring up issues related to the choice of inputs to the valuation technique. Issues are raised by the nature of variables included in fair value: observable parameters, non observable parameters, model adjustments.

Observable parameters

63. In order to determine the inputs of a bespoke CDO using as much as possible observable data, banks usually rely on different information sources. For instance, in order to estimate the dependency of the default times of the underlying portfolio of CDS or, in other words, the correlation curve of the portfolio, the bank refers to an index-related correlation curve (see §29.). This approach of mapping the specific features of the instrument with those of an observable data (i.e. hedging instrument price) requires identifying a reference instrument (an index in our case). In our example, the proxy is an index based on a similar basket (in terms of names and geographical situation of the counterparties).

64. The notion of observable inputs is not clear under IAS 39. In practice, there has been some room for interpretation of IAS 39 as regards what can be considered as a market price or as an observable input, resulting in a blurring of the fair value hierarchy[11]. For instance, prices obtained from a limited number of external sources, with limited actual transactions (such as brokers or consensus pricing services) have usually been regarded as "market" prices in normal market conditions (e.g. recovery rates). In times of stress, when such sources exhibit wide movements in prices, entities were tempted to change their policy and stop considering such sources as valid market prices (see§34). This trend highlights questions about the reliability of data provided by consensus pricing services and quotations from brokers especially when they are not supported by actual trades.

Accounting issues n° 5

- What are "market inputs" or "observable inputs" in practice?
- In particular, to which extent could consensus prices be assimilated to market inputs?

65. According to IAS 39 AG 71 the fair value of an instrument is given by the price at which a transaction would occur on the most advantageous market. However it is not clear whether this principle should be applied to the selection of observable inputs. The notion of most advantageous market is in any case not straightforward for inputs which can be observed on different marketplaces. It is by essence contingent and depends on the position of the entity.

[11] IAS 39 introduces an implicit fair value hierarchy based on the nature of inputs to the valuation technique. IAS 39 prioritizes market quotes and then market inputs compared to unobservable inputs incorporated to valuation techniques.

Accounting issues n°6

- Should the "most advantageous market" principle also be applied to inputs?
- Which criteria should be introduced into IAS 39 to clarify the concept of "most advantageous market"?
- Should the appreciation of the liquidity of a market be retained as a criterion to determine the "most advantageous market"

Non observable parameters

66. Non observable parameters are by essence entity-specific inputs. This is the case of the model parameters (extrapolation parameters, correlation parameters, rescaling parameters in §33 and §35) used in the modelling technique. Different techniques are used to estimate the internal model parameters from observable inputs. For instance a corroboration technique[12] is used to build base correlation curves of the bespoke CDO from the index base correlation curves (see §26). Another step in the pricing process of the CDO is the selection of an approach (Monte Carlo simulation or Semi Analytics Formula as mentioned in §27) to simulate the expected pay out related to the instrument. These approaches involve assumptions beyond inputs in order to derive the final value of the model parameters (see §32). At each stage of this process choices and assumptions are based on judgment.

67. Due to their particular nature, entity specific inputs are not disclosed. The access to this in house information might be problematic and there is no guarantee that all market participants use the same parameters and give the same values to these parameters.

68. According to IAS 39 paragraph AG75 "*A valuation technique would be expected to arrive at a realistic estimate of the fair value if (a)* ***it reasonably reflects how the market could be expected to price the instrument*** *and (b) the inputs to the valuation technique* ***reasonably represent market expectations*** *and measures of the risk-return factors inherent in the financial instrument*."

[12] The objective of a corroboration technique is to map the inputs of a model with data of observable markets, for instance, by correlation or other statistical means. Definition of corroboration is given in paragraph 28 (level 2 inputs) of the statement of financial accounting standard N° 157.

69. Applying those accounting provisions results in trying to check the fair value of bespoke CDOs through back-testing techniques based on observable inputs. As the CDO is a bespoke product, the process of back-testing the fair value requires assessing whether it reflects merely indicative prices that would be obtained on a hypothetical market. Due to the specific nature of the product the process of back-testing could not be easily implemented. Whereas the value of the whole product might be difficult to test, and the process of back-testing should be focused on deemed observable components (i.e., repricing of mark-it baskets, back-testing of extrapolation assumptions as mentioned in §32 and §35 b). However when there is no available market price for substantially the same or a similar instrument, the soundness of the modelling technique as a whole could not be guaranteed as it will not be possible to test the modelling technique with market data.

Accounting issues n° 7

- Where there are no market participants at all, is it possible to make assumptions about a hypothetical market participant view, when the latter is nobody other than the account preparer himself?
- How to deal with the practical issue regarding the public availability of information of other market participants?
- Which valuation technique should be used when it is impossible to back-test or calibrate the model with market data? How to check the reliability of this kind of model?

Model adjustments

70. The valuation process of the bespoke CDO is based on various estimations as explained above (e.g. assumptions related to the model and non observables inputs) that create uncertainty surrounding the model value measurement. In these circumstances, adjustments are made to the model value measurement. For example, model risks adjustments are made to take into account the uncertainty about the value of the parameters (i.e., the recovery uncertainty as mentioned in §35) and model assumptions to price the instrument. The uncertainty could be greater in particular when entities rely on a narrow range of information sources for valuation. A liquidity adjustment is also made to take into account the consequences of a potential deterioration of the liquidity of certain inputs, like indexes.

71. As per the requirements in paragraph IAS 39 paragraph AG76, the model valuation is required to incorporate all factors that market participants would consider in setting a price at that point in time and to consider effects of changes in those factors (IAS 39 paragraph AG78). IAS 39 paragraph AG82 provides a list of inputs to valuation techniques and risk factors (time value of the money, credit risk, foreign currency exchange prices, volatility….). The application guidance mentions that valuation will be based on one or more (or perhaps other) of these inputs.

72. Hence, it seems clear that pricing in the market, taking into account the actual market conditions, indicates that prices should incorporate additional risk for liquidity and uncertainty into fair values. The financial crisis has notably demonstrated that the incorporation of a liquidity factor is particularly relevant. However the standard is not explicit related to all acceptable adjustments.

73. Nevertheless, a question arises on whether those adjustments should be estimated and recognised on an individual or a portfolio basis. This point is particularly significant in the case of bespoke CDO since the risks of these instruments are usually managed dynamically on a portfolio basis in a way that can be compared to the technique of Asset Liability Management. This issue is also related to the allocation method of risk factors or mark-to-model adjustments referring to the unit of account issue which is not clearly defined in IAS 39.

74. In the absence of specific guidance in IAS 39 on the treatment of model risk and liquidity risk adjustments or of any particular risk which can generate a significant volatility, inconsistent practice might occur . Appropriate disclosures might be additionally needed. The consistency between risk management practices regarding valuation adjustments and accounting purposes is also viewed as desirable.

Accounting issues n° 8

- Shall model risk, liquidity risk, counterparty credit risk[13] be systematically included in the fair value of an instrument? Is consistency between risk management practices regarding valuation adjustments and accounting purposes viewed as desirable?
- What is the relevant unit of account for valuation adjustments? Should these adjustments be made on an instrument by instrument basis or on a portfolio basis; and in the later case on a net or gross basis?
- How to deal with liquidity issues, especially when transactions on a market come to a total halt. In particular, how to model the liquidity discount?
- In the present context should the IAS 39 principles be supplemented by more prescriptive technical guidance whose application could be mandatory?

[13] As recommended in the report of the Committee of European of Banking Supervisors on issues regarding the valuation of complex and illiquid financial instruments, 18 June 2008

75. Moreover the valuation technique might no longer be viewed as "commonly used by market participants" to price the instrument (IAS 39 paragraph AG74) when for instance valuation techniques evolve due to the incorporation of technical innovations or when external phenomena, like a market crisis, occur**.** Additionally the estimate of fair value involves significant judgment. In this context, the assessment of the "reasonable" feature of the inputs to valuation technique that should reflect market expectations is particularly difficult to achieve. Since judgment plays a key role in the valuation process, it should be subject to a high level of scrutiny. In this regard, robust governance and control procedures are needed[14]. At the same time, disclosures about assumptions and judgment might be enhanced. Transparency in the financial reporting would allow for example for benchmarking.

Accounting issues n°9

- How to promote financial transparency and enhance disclosures about assumptions and judgment?
- Which factors should be considered in appreciating if the valuation technique represents *reasonably* market expectations?
- Improving information on how inputs to valuation technique represent *reasonably* market expectations might be interesting to explore?

12 - Issues arising from inputs becoming unobservable

76. During the life of the bespoke CDO, some valuation parameters might become unobservable, for instance when market disruptions occur. In our example, some market participants have considered that CDS prices (see §34. a) might no longer be viewed as an observable input due to significant illiquidity in the market. Similarly, the index tranche market has experienced unusual movements in the recent period which has created opportunities for unusual arbitrages like arbitrage between the index and its components or between different index tranches (see §34.b). Therefore, for certain institutions, the reference to the base correlation curve of the index tranche to derive the base correlation curve of the bespoke CDO no longer appears relevant.

[14] See the Basel Committee report on fair value measurement and modeling : an assessment of challenges and lessons learned from the market stress, 12 June 2008

77. In the above circumstances, the few available quotes that are still observable tend to be disregarded by some market participants. Under IAS 39, observable quotes on an active market might be ignored if the entity can demonstrate that available transaction prices are not fair values. IAS 39 paragraph AG69 states that the fair value is established with the presumption that the firm is a going concern. Therefore, the fair value is not the amount an entity would receive or pay in a forced transaction, involuntary liquidation or distressed sale. In the present context diverging opinions have arisen on the characteristics of the transactions that could be qualified as "forced transactions" or "distressed sales".

78. In the case of bespoke CDO, the question at stake is to determine when index-tranche prices or CDS prices might no longer be considered as relevant references for the fair valuation. In other words the issue is whether in this context they reflect forced transactions or distressed sales.

79. Strong evidence is necessary to assess that the transactions is between unwilling parties. In the example, a change in the technical characteristics of the CDS market might not be sufficient evidence to establish that the observable prices represent forced or distress sales and that the market has ceased to be active according to IAS 39.

80. International audit firms[15] have considered the market would still be viewed as active if transactions are occurring frequently enough on an ongoing basis to obtain reliable pricing information. They mentioned that it would not be appropriate to disregard observable prices in an active market even if the market is relatively thinner or illiquid as compared to previous periods[16].

81. Further some international banks have considered that, due to the lack of liquidity of the market, expectations of downward pressures, extremely high risk premia, uncertainty have created a situation in which the market has failed to provide pricing inputs that reflect actual default probabilities of the assets. They have considered that the prices or market inputs were irrational and cannot be used to provide a true picture of the financial position of firms. Applying this rationale to our example, some price makers might consider that the selected index no longer provides a faithful representation of the fair value of the instrument as it is disconnected from the economic fundamentals of the underlying pool of assets. Consequently they could consider that the index tranche prices are no longer observable data as it does not depict the actual values of current market transactions. Although those assumptions should be documented, it might not be sufficient according to IAS 39 to avoid using those available quoted market prices.

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[15] Global Public Policy Committee « Determining fair value of financial instruments under IFRS in Current market conditions » -13 December 2007. Center for Audit Quality «Measurements of Fair Value in Illiquid (or less liquid) Markets»- 3 October 2007

[16] The CESR has made the same remark in its report on fair value measurement and related disclosures of financial instruments in illiquid markets- 10 July 2008

Accounting issues n°10

- In practice, under which circumstances could a transaction be qualified as "forced transaction" or "distressed sales", or a market would no longer be considered as active?
- Should the same guidelines be used for the instruments and the inputs?

82. When observable parameters are no longer observable, the valuation model could be recalibrated on the basis of unobservable parameters but IAS 39 does not provide any guidance regarding the nature of unobservable parameters that could be selected to estimate a fair value measurement: inputs related to instruments that do not have many common features with the CDO fair valued, internal inputs such as entity-specific historical assumptions, expert data and so on.

83. In our example, changes in the perception of the recovery rate could occur when market conditions deteriorate. As such, this situation has lead to a shift from the use of a fixed recovery rate to an internal estimated range from 20% to 40% (see §33). Also, when market disruption occurs in the spread curves of certain CDS names, a usual method is to map the name to a similar CDS curve whose choice is driven by historical analysis and observations (see §34 a).

84. The IAS 39 does not give a clear hierarchy of sources of inputs, when there are no observable inputs. One major issue from this standpoint is the use of historical assumptions. One of the disadvantages of historical data lies in the fact they cannot be systematically corroborated with observable data in the current market conditions. Therefore the significance of these historical assumptions with current market expectations might be difficult to assess.

Accounting issues n°11

- When there are no observable inputs could a hierarchy of alternative sources be drawn under IFRS?
- In particular, under those circumstances, to what extent could it be possible to use historical data under IFRS?

85. A change of status of inputs (for example in case of illiquidity on the index market as mentioned in §34.b) can also lead to a modification of the hedging strategy of the bank and give rise to a change of valuation model. As a last resort, when the markets of all available hedging instruments become illiquid, it might be necessary to use an alternative valuation technique to estimate the value of the instrument. A bank could in such circumstances decide to revert to a discounted cash flow model with assumptions based on expert judgment and "in house" historical observations provided that this valuation technique includes a discount factor for the absence of liquidity.

86. IAS 39 does not address the issue of a change in a valuation technique, in particular a change in a valuation model due to a change in the hedging strategy as a consequence of a lack of observable parameters. Additionally, IAS 39 does not mention how a change in valuation should be treated from an accounting perspective, whereas FAS 157 paragraph 20 mentions that "*revisions resulting from a change in the valuation technique or its application shall be accounted for as a change in accounting estimate*". Such changes should be disclosed.

Accounting issues n°12

- Is it possible to shift from one valuation technique to another one during the life of the product (e.g. subsequent change of a valuation model based on a change in the hedging strategy in particular when there are no longer observable inputs on which the initial model depends)?
- If the answer is "yes", should this change be treated like a change of estimation to be applied in a prospective way (application of FAS 157 requirement)?

87. Under FAS 157, different levels of the fair value hierarchy have been defined, but it is sometimes difficult to identify exactly the border between the level 2 and level 3 inputs. Regarding reconciliation between IFRS and US GAAP on the fair value hierarchy, it would be useful to reduce complexity and increase comparability of financial statements. The materiality of unobservable inputs and valuation adjustments to assess the level of a fair value measurement would also be helpful to clarify the differences between the levels of the fair value hierarchy under IAS 39. Explicit quantitative disclosures in IFRS 7[17] related to the levels 1 and 2 of the fair value hierarchy, as required by FAS 157, might contribute to a greater transparency (e.g. detailed disclosures related to each level). More broadly speaking expanded disclosures on level 3 fair value measurements might contribute to a better understanding of the limits inherent to the valuation process of illiquid instruments. A better information on the sensitivity of the value of complex financial instrument under different scenarios could also be desirable (e.g. disclosure related to the difference between a fair value measurement based on available observable data and a fair value measurement based on unobservable data when available data are disregarded).

[17] Financial Instruments : Disclosures

88. The classification of the fair value measurement in the fair value hierarchy requires judgment. For example inputs provided by consensus services (e.g. the recovery rate in our example) might be considered as an observable input by some participants whereas others would not view those prices as traded prices and as such qualify those inputs as unobservable. It could also be argued that assumptions related to the choice of a valuation technique might be taken into account in evaluating the level within the hierarchy at which a fair value measurement falls. Regarding mark-to-model adjustments, FAS 157 states clearly in paragraph 29 that "*an adjustment that is significant to the fair value measurement in its entirety might render the measurement a Level 3 measurement…*"

Accounting issues n°13

- Should disclosures on the fair value hierarchy and the residual sensitivity of instruments fair valued by models be enhanced?

13 - Summary of issues identified

To conclude, this paper has addressed some issues raised in practice during the valuation at fair value of a bespoke CDO. It was not aiming at considering all the issues on the fair value measurement topic.

The principal issues that could be highlighted and that may need in our view further guidance are as follows:

- How to determine the existence of an active market? Which criteria should be used to demonstrate that quotes are available on an active market?
- In practice, under which circumstances could a transaction be qualified as "forced transaction" or "distressed sales", or a market would no longer be considered as active?
- Is there in the IFRSs literature an implicit hierarchy between the different valuation techniques that are available (i.e. comparable instruments, in-house models, other…)? What are the appropriate criteria in order to assess whether two instruments are comparable in substance?
- What does a valuation technique "commonly used" by market participants" mean?
- What are "market inputs" or "observable inputs" in practice? In particular, to which extent consensus prices could be assimilated to market inputs?
- Is the price of complex financial instruments, whose fair value is based on models including significant in house adjustments and parameters, more an "in use" price than an "in exchange" price ?
- What is the relevant unit of account for these instruments (stand alone or portfolio basis)?

- Is consistency between risk management practices regarding valuation adjustments and accounting purposes viewed as desirable? For instance shall model risk, liquidity risk, counterparty credit risk be systematically included in the fair value of an instrument and if yes, how?
- When there are no observable inputs could a hierarchy of alternative sources be drawn under IFRS?
- Is it also possible to shift from one valuation technique to another one during the life of the product (e.g. subsequent change of a valuation model based on a change in the hedging strategy in particular when there are no longer observable inputs on which the initial model depends)?

Guidance in particular on these aspects would allow for greater consistency in valuation practices and enhance the comparability of financial statements.

Glossary

[1] Dislocation

Dislocation is a rather vague term that is used to describe a dysfunctional market. Dysfunctional market may mean a disruption of normal conditions created by an imbalance between offer and demand. Such an imbalance can be due to several factors. Uncertainty as to the value of the instrument (or assets) can for example dry up the buy side, and significant market movements may lead to situations where all market participants are interested in one side of the market (one-way market), in order to hedge/protect their positions.

Dislocation generally results in divergence from the market value of the instrument on one hand, and the value expected by generally accepted models or other economic analysis of the instrument's cash flows on the other hand. Theoretical arbitrage opportunities (free lunch) may appear, but the realization of such arbitrages is hardly achievable due to the absence of willing counterparties.

[2] Recovery

On occurrence of a default event for a given bond, there is an expectation that the issuer will redeem part of the outstanding notional. This is referred to as the recovery. In the text, recovery level or recovery rate terms are used, these refer to the % of the notional amount redeemed.

[3] Term structure of default probability

The default probability is a notion that is associated with a maturity. For that reason we call it a "term structure". The exact definition is "the probability of an entity to default within the period 0 to time T".

Term structure of conditional default probability is another expression of this time dependency. It is easy to observe that the probability of defaulting within the next 2 years includes the probability of defaulting within the next 1 year. Knowing these two probabilities, one can isolate the probability of defaulting "within the first year", "the probability of surviving during the first year", the probability of defaulting "during the second year",….

Conditional probability of default for a given future point in time is defined as the probability of defaulting at that point in time, knowing that the entity has survived up to that point. These probabilities are called the "term structure of conditional default probabilities"

[4] Term structure of CDS spreads

As per the description of a CDS, we know that the CDS is protecting its buyer (the payer of the premium), from the risk of default in the reference entity. This protection is of course linked to a time horizon.

Given the probability of default and of survival at each future point in time, the seller can compute exactly the probability and the exact amount of payment at each future point in time, hence the value of the protection.

The premium of the CDS is set as the breakeven premium level i.e. the level at which the protection leg and the premium payment one have opposite values. This breakeven premium is the quoted CDS spread.

It is easy to understand that the breakeven level is dependent on the maturity of the product. Hence, for a given reference entity, the CDS spread is different between a short term or a long term CDS contract. Quotations are therefore such for each maturity, there is a CDS market level. The curve CDS (Time) is what is termed “term structure of CDS spreads”.

[5] Index skew

As explained in the text, indices are nothing other than standardised pools of underlyings. Indices are quoted in the market in two forms: credit protection against tranches of the pool [x to y tranche] or credit protection against the total pool (quoted as CDSs on the [0-100%] tranche),

From a pure theoretical stand point, a CDS on the total pool [0-100%] is equivalent to the sum of single name CDSs whose weights mirror the pool composition.

However, due to differences in liquidity between the CDS on the [0-100%] index tranche and the CDS on the constituents, this equivalence breaks up leading to theoretical arbitrages.

There are many market participants that constantly take advantage of this discrepancy, through selling the index [0-100%] CDS and buying the individual components and vice versa. However, the high number of index constituents prevents the existence of a constantly perfectly arbitraged market. Hence, the skew should be taken as a market variable, reflecting the extent to which the market is consistent.

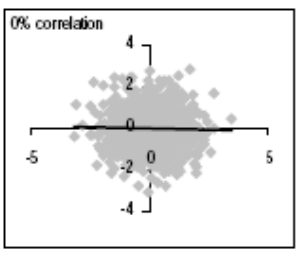
Skew is defined as the difference between the theoretical spread of the [0-100%] tranche of the index (as derived from the CDS spreads of its components) and the market quoted spread.

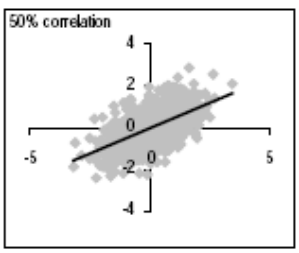
It is important to note that the skew creates difficulties when modelling CDOs because the hedge instruments (whose price taken also as inputs to the model) are composed of individual CDSs and of index tranches. As these display arbitrage opportunities, specific attention is required to avoid self-inconsistent modelling.

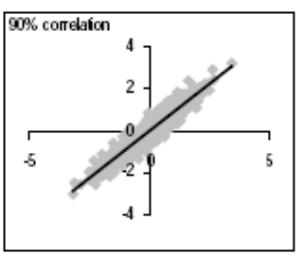
[6] Correlation skew

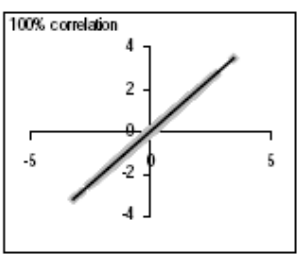
(Graphs are extracts from the JPM paper “Credit correlation: A guide” issued 12 March 2004)

When thinking about correlation between two random variables, general intuitive understanding corresponds to plotting the linear regression between the realizations of these variables into a two axis diagram and look at the resulting cloud. When this cloud is purely linear, there is 100% correlation, and when the regression residue (R^2) is big, there is less correlation.









Correlation is far more complex than this intuitive understanding. Indeed, the above, which resumes the correlation to one scalar (X%) is only valid for variables whose distribution is normal (Gaussian).

The correlation skew measures the extent to which the description of the joint behaviour of two normal variables cannot be resumed into one single scalar.

In credit markets, the term skew usually refers to the fact that when implying a correlation from different tranches in the same index, one ends up with different correlation levels for each tranche. This proves that there is no single correlation (linked to the pool) that could price at once all the tranches. Hence the joint behaviour of the default time is more complex than the intuitive correlation.

[7] Copula

In the credit world what we're looking for is the correlation between the default times for two names. Knowing that the default times do not follow a normal distribution, we need to use a copula technique.

Copula technique is a way to link the distribution of each of n variables (X_i) to derive a multi-variable distribution. The most intuitive way again to link the variables is to use the so-called Gaussian copula.

The base idea of this is to proceed in several steps times:

- firstly it performs a functional transformation of each variable ($U_i = F(X_i)$), so that the distributions of the resulting variable U_i becomes normally distributed (this functional transformation is unique),
- Then the new variables are correlated in the "intuitive" way, with the correlation information being resumed by one variable (or matrix if there are more than 2 variables).
- Finally, for each joint realization of the functional transforms (U_i), the variable are inverted back to the initial X_i

Copulas techniques are however not limited to the "intuitive" way of thinking of correlations.

[8] Monte Carlo Simulation

Numerical technique for approximating a pre-defined theoretical distribution by generating uniformly distributed random numbers and transforming them into the required sort of random numbers.

[9] Portfolio loss distribution

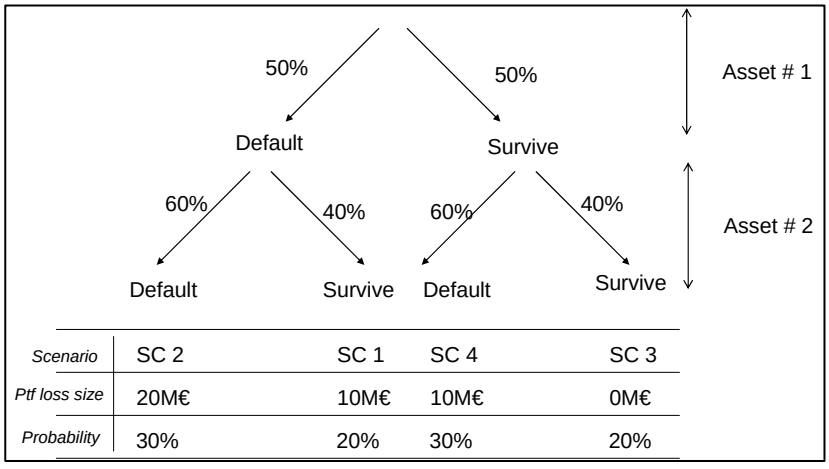
We shall show to the reader how correlation can affect the loss distribution of a portfolio. We will simplify the example so that we can use a simple mathematical concept, probability trees. We take a portfolio composed of two assets. Each of the assets has 10M€ size:

- Asset #1 has 50% default probability
- Asset # 2 has 60% default probability

We will consider two cases to illustrate the correlation sensitivity. For each of them, we will guide the reader through the construction of the probability trees.

- First case assumes that defaults events of the two assets are independent (correlation = 0),
- Second case takes into account 50% correlation assumption.

First case: here the default events are independent, and therefore, the probability tree is rather simple:

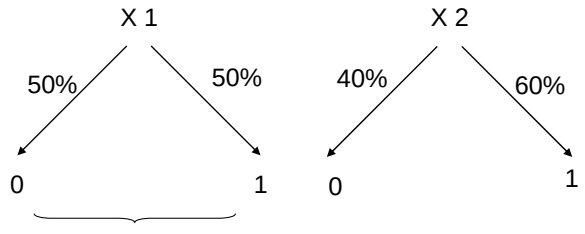


Scenario	SC 2	SC 1	SC 4	SC 3
Ptf loss size	20M€	10M€	10M€	0M€
Probability	30%	20%	30%	20%

One can verify that the portfolio loss expectation stands at 20M€ * 30% + 10M€* 20% + 10M€* 30% + 0 * 20% = 6+2+3 = 11M€. This is the exact amount of loss expectation, as obtained from each of the assets:

EL (asset 1) + EL (Asset 2) = (50% * 10M€ + 50%*0M€) + (60% * 10M€ + 40%*0M€) = 5+6=11M€

Second case: here the default events are correlated with correlation 50%. The probability tree here is much less simple to construct.



First of all, we need to understand which correlation we're talking about: the correlation between default events. We therefore need to define a variable associated with the events. These variables take value 1 in case of default and 0 in case of survival. We can easily derive their expected values and variances.

Expectation of X_1 = $E(X_1)$= 0.5

Expectation of (X_1^2) = 0.5

$Var(X_1) = E(X_1^2) - E(X_1)^2 = 0.25$

Expectation of X_2 = $E(X_2)$= 0.6

Expectation of $(X1^2)$ = 0.6

$Var(X1) = E(X1^2) - E(X1)^2 = 0.24$

In the next step, we can express the correlation using the expectations and variances, as shown in the graph below:

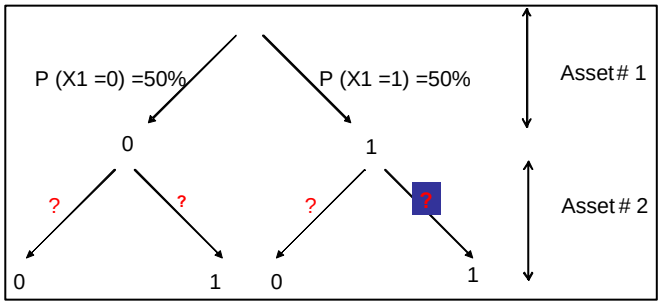
By definition, correlation of default is the correlation between X1 and X2. It writes

$$\rho(X1, X2) = \frac{E(X1 * X2) - E(X1) * E(X2)}{\sqrt{(Var(X1))} * \sqrt{(Var(X2))}} = \frac{E(X1 * X2) - 0.5 * 0.6}{\sqrt{(0.24)} * \sqrt{(0.25)}} = 50\%$$

Hence, E(X1 * X2) = 0.42

The correlation information enables us to obtain the main element of the covariance of the two default events i.e. **E(X1 * X2)**

Let's now take the same probability tree as in case 1. Here, the difficulty comes from the fact that the conditional default probabilities are different from the default probabilities, since the events are inter-dependent.



Recalling that we obtained **E(X1 * X2)** from the correlation information, we can write this using the conditional default probability notations:

E(X1 * X2) = P (X1 = 1) * P (X2=1 knowing that X1 = 1).

Or with usual notations,

=P (X1 = 1) * P (X2=1 | X1 = 1).

Replacing with the values obtained so far, we have: 0.42 = 0.5 * P (X2=1 / X1 = 1).

Hence we deduce P (X2 = 1 | X1 = 1) = **84.5%.** this represents the probability that asset #2 defaults, knowing that asset #1 already defaulted. It is the number highlighted in the tree above.

Once this is known, we know that P (X2 = 0 | X1 = 1) = 1- 84.5 % = **15.5 %.**

Next step consists in filling the left part of the tree. Here, we need some mathematics.

P(X2 = 0 / X1 = 0) = 1 - P(X2=1 / X1 = 0)

= 1 - P (X2= 1 and X1 = 0) / P(X1 = 0)

= 1 - P (X1 = 0 / X2 = 1) * P(X2=1) / P(X1 = 0)

= 1 - [1- P (X1 = 1 / X2 = 1)]* P(X2 = 1) / P(X1 = 0)

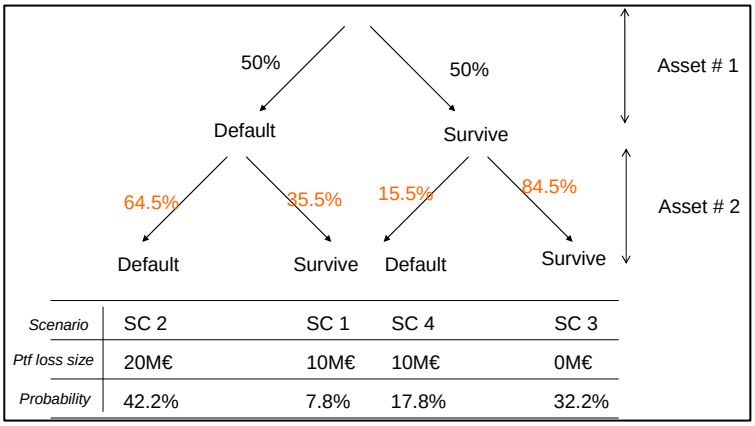
= 1 - [1 - E (X1 * X2) / P(X2 = 1)] * P (X2 = 1) / P(X1 = 0)

And then we replace with the known values:

= 1 - [1 – 0.42 / 0.6] * 0.6 / 0.5 = **64.5 %**

And comes also automatically, P(X2 = 1 / X1 = 0) = 1 – 64 % = **35.5%.**

The tree is now filled and we can compute the losses and their probabilities at each state of the world



Scenario	SC 2	SC 1	SC 4	SC 3
Ptf loss size	20M€	10M€	10M€	0M€
Probability	42.2%	7.8%	17.8%	32.2%

Here again, we can verify that the loss expectation remains

11 M€ = 20M€ * 42.2 % + 10M€ * 7.8%

….

Now let's concentrate on the portfolio loss distributions as obtained from the two trees.

Total portfolio loss	Probability with Correl 0%	Probability with Correl 50%
0 M€	20%	32%
10 M€	50%	26%
20 M€	30%	42%

We now clearly see how the probability of high losses is increased with higher correlation. We also see how the probability of lower losses (less than 10M€) are diminished accordingly.

This is because the correlation only influences the distribution, but keeps unchanged the total loss expectation: in higher correlation regime, the big losses get more probable, and this is compensated by lower probability of low losses.

[10] Consensus pricing services

The basic principle of a consensus pricing service is as follows:

- Multiple participants submit their best estimate of mid market price, to the consensus. This step is confidential.
- The consensus service provider collates all the contributions and produces a single price.

  This is usually subject to testing, by the provider, of the reliability of the contributions. This ensures that contributors are not manipulating the consensus. Whenever a price is considered unreliable, the contributor is excluded and no feed back is given to him,
- The price is then sent back to the contributors as an average. This is generally accompanied by a full battery of auxiliary information such as the standard deviation of the prices received. Some consensus providers feed their contributors with a tailored analysis of the quality of the submission.

The price calculated by the provider is generally the average price.

Semantically, consensus refers to the general agreement among the members of a group, each of which exercises the same discretion in decision making. Consensus also refers to the method used to reach such an agreement.

The process of reaching consensus described above might seem the most natural one. However, this is only one way to achieve consensus (one can imagine more or less iterations, sophisticated filters,…)

It is also interesting to question whether the average price is reflective of a fair value. And it is interesting to see that the indicative nature of the consensus price is not the only point that gives rise to such questioning. Indeed, we can observe that while in first periods the reliability of the consensus prices was seen as directly proportional to the number of contributors, this is less true today. Many banks ask for "reduced consensus", concentrating on the major players only.

Finally, the most controversial point in consensus pricing service resides in its "black box" nature. Indeed, users have no way to know whether peers are contributing their mids, or their adjusted mids.…

Also, it is not always clear whether the prices are contributed by front officers, or valuation officers: this distinction is key in determining whether the average price is an average of quotations (corresponding to a willing counterparty's price) or valuations (taking into consideration the portfolio aspect).
