

Counterparty Risk Management of Derivatives

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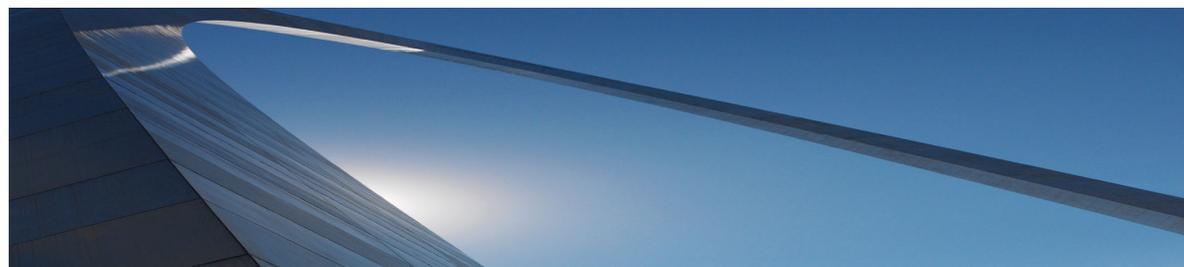
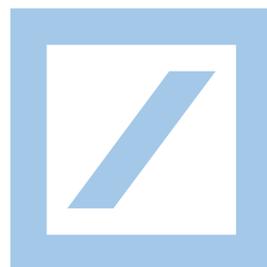
Deutsche Bank AG London

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1. Counterparty credit risk management – a brief history and outline

■ Objectives

- To protect a bank's balance sheet in the case of default of counterparties to long-term derivatives trades
- To treat counterparty risk on similar footing to loan exposure

■ Early starters

- JP Morgan, UBS (2001), Goldman Sachs, Deutsche Bank (2002)

■ Other Banks

- Citibank, Morgan Stanley, Barclays, Credit Suisse, Dresdner, ABN Amro, Societe Generale, Lehman

■ Set up

- **Basic calculation:** price swap as credit risky, i.e. as being short on option to enter the swap under a credit event of the counterparty
- **Operational choices:** credit price entire derivative book or credit price subset of book and credit reserve the rest
- **Management choices:** Counterparty Management reports into Front Office or into Controlling / Risk Management. Functions alongside Loan Exposure Management or separately.
- **Credit charging and P/L:** above the line or below the line. Counterparty management book has its own P/L contributing to the business' P/L, or charges the business on an ad hoc basis, below the line.
- **Activities:** credit charging of new business, purchasing of credit protection against exposure, hedging exposures with swaps, swaptions, fx spot and options, equity puts

1. Counterparty credit risk management – a brief history and outline

■ Recent Large Defaults

- Parmalat (Dec 2003), Collins & Aikman (May 2005), Delta and Northwest Airlines (Sep 2005), Delphi (Oct 2005), Calpine (Dec 2005), GM (?)

■ Recent Default Statistics

- 2002: 141 defaults on \$163 bn of debt
- 2003: 80 defaults on \$34 bn of debt
- 2004: 49 defaults on \$16 bn of debt
- 2005: 37 defaults on \$42 bn of debt

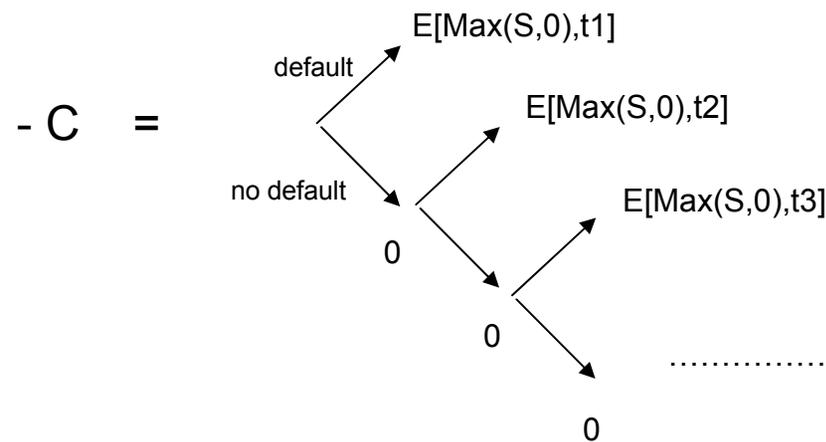
“Credit risk, and in particular counterparty credit risk, is probably the single most important variable in determining whether and with what speed financial disturbances become financial shocks with potential systemic traits.”

Towards Greater Financial Stability – The Report of the Counterparty Risk Management Policy Group (CRMPG II)
E. Gerald Corrigan *et al.*

2. Standard derivative counterparty hedging

- The basic credit charge calculation

Credit charge = - swap replacement cost = “ C ”



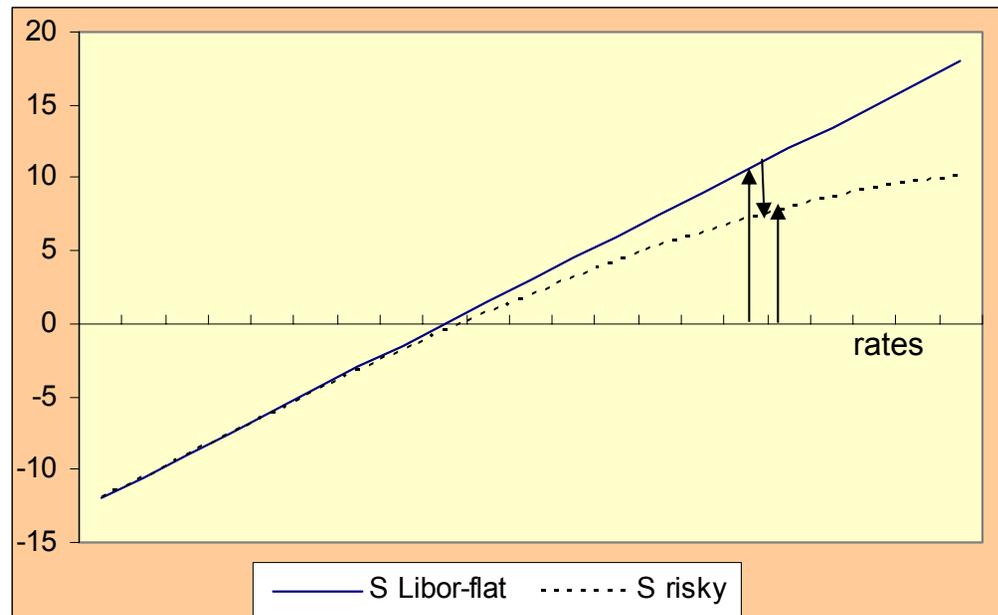
$$C = - \sum p_i * E_i ,$$

p_i = probability of default in interval i , $E_i = E[\text{Max}(S,0),t_i]$ = European option to enter into swap

$$S_{risky} = S_{Libor-flat} + C$$

2. Standard derivative counterparty hedging

$$S_{\text{risky}} = S_{\text{Libor-flat}} + C$$



- $S_{\text{Libor-flat}}$ is a vanilla swap booked in a vanilla book
- C is a hybrid credit swap (a short enter option) booked in the counterparty management book (always a negative MTM)

2. Standard derivative counterparty hedging

- The booking of C (the credit charge) as a trade leads to risk sensitivities (linear and non-linear) to interest rate and fx as well as credit
- The hedging of credit risk sensitivities amount to an instruction to buy CDS such that the underlying risk plus the CDS are insensitive to small moves in credit spreads
- At credit spread widenings reflecting near-default situations, continuous hedging will have entailed a CDS notional position equal to the mark-to-market of the underlying derivative
- If there is no default, the credit charge trade C will drip positive carry into the book, while the CDS will drip negative carry, to the point where both the underlying trade and the CDS expire, and the credit charge goes to 0
- Under default (for a positive net exposure to the bank) the process is more involved:
 - the underlying swap (of Libor-flat MTM = S), goes to its recovery value, $r * S$
 - the CDS (initially of par value = 0), goes to a MTM = $(1 - r) * S$
 - the credit charge trade C goes to a MTM = $-(1 - r) * S$

2. Standard derivative counterparty hedging

- The c/p mgmt book pays S to the vanilla book to make it whole, and acquires a claim (through the defaulted swap) against the counterparty of value $r * S$, thereby making a loss of $(1 - r) * S$
- The credit charge trade C is torn up, releasing reserves of $(1 - r) * S$. These two events make the counterparty book flat of P/L
- The c/p mgmt book buys face value S of defaulted bonds in the market to deliver against the triggered CDS contracts. The unwinding of the CDS occurs at no P/L to the book since it had a MTM value of $(1 - r) * S$, which reflects exactly the delivery of defaulted bonds against par in the CDS
- The c/p mgmt book holds on to the defaulted swap claim through the workout period until final resolution and recovery is reached

Does all this seem too good to be true? It may well be.

What can go wrong? Mainly the following:

1. There is insufficient CDS liquidity to hedge the necessary amount.
2. There is more CDS notional traded than bonds to deliver into the credit event
3. The actual recovery of the swap, possibly years later, is very different from the recovery value at the time of default, and it would have been impossible to hedge that

Basic Risks – deliver basis: bond vs. swap, deliver squeezes

Lets look at the latter two basis risks:

- **Delivery squeezes:** upon the triggering of the CDS due to a credit event, protection buyers must buy bonds in the market to deliver against the CDS protection bought. If there is more notional CDS having been traded in the market than outstanding defaulted bonds trading at the time of default, protection buyers will bid the market up to unreasonable levels, and lose a lot of the value in the CDS
- **This was seen in all the defaults mentioned above (Parmalat, Collins & Aikman, Delta and Northwest Airlines, Delphi and Calpine)**
- **What could happen under a GM default, where the amount of CDS traded is much larger than the available pool of bonds?**
- **Bond vs. swap recovery basis:** CDS are settled shortly after default at the recovery levels in the market at the time of default (given by defaulted bond prices). Swap claims have to go through a workout process which can last years and final recovery can be very different from recovery at the time of default. There is no hedge possible to this recovery basis risk.

4. Non-standard derivative counterparty hedging

- CLNs on non-standard delivery terms: payment obligations, fixed recovery
- Swap wraps
- Variable notional CDS
- Quanto CDS
- Basket trades: CDOs, FTDs
- Swaptions, FX options, equity puts

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