CVA in Energy Trading

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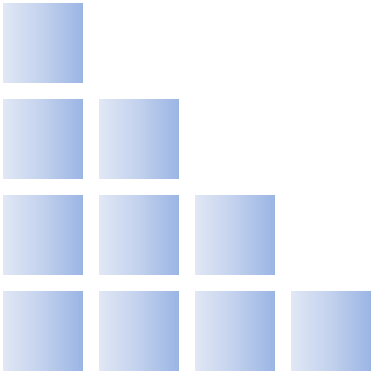
Credit Risk in Energy Trading

London, November 2016



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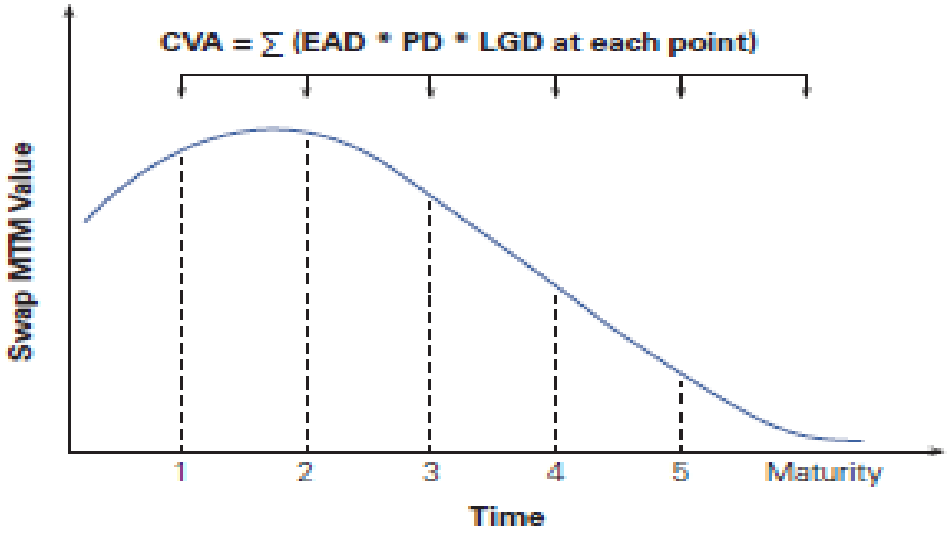
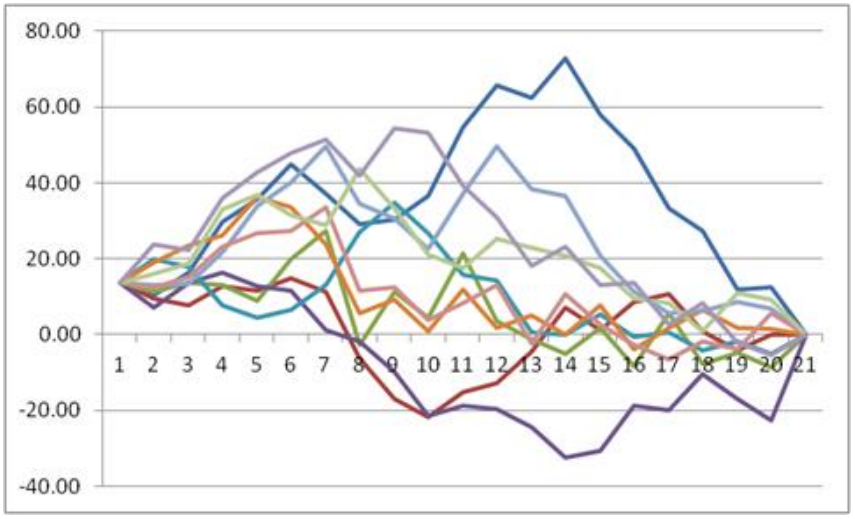
What is CVA (Credit Valuation Adjustment)?

- Adjustment of the Present Value (PV) of a derivatives trade to take into account the default risk of the counterparty over the lifetime of the trade



- CVA exposure refers to uncollateralised exposure

Step 1 - Measuring Exposure over Lifetime of a Trade

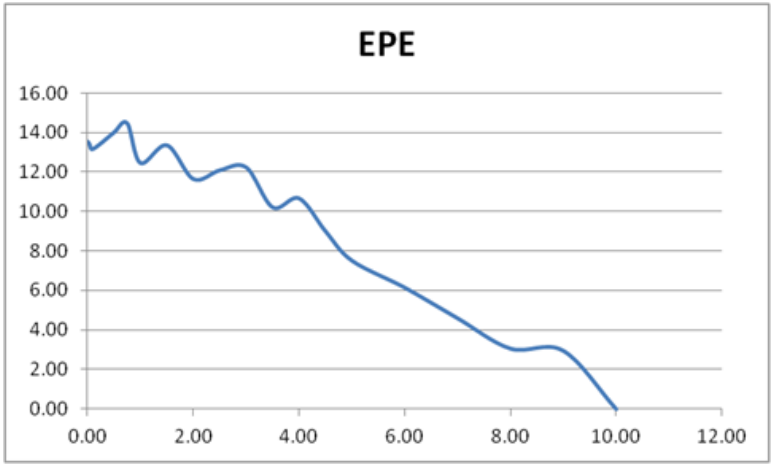


Step 1:
Perform Monte-Carlo simulation of Forward Prices

Model correlation and volatility of market prices.

Step 2: Re-calculate PV of derivatives trade for every possible simulated price path

Step 3: Average out positive PV's to draw the "Expected Positive Exposure" over trade lifetime



Step 2 – Apply Default Probability and LGD

- Apply Probability of Default (PD) for each timebucket of exposure

- Sources of PD
  - Traded CDS
  - Mapping to CDS or CDS Index
  - Rating Derived PD
  - Estimated PD
  - Assume Recovery Rate to define LGD

- CDS curves give market estimates of default risk at different points in the future

Step 3 – Aggregate and discount for CVA

- Sum of all Exposures times PD and LGD
- Discounted to today → CVA
- CVA is the “market price of counterparty risk”
- EPE already has to take into account:
  - Collateral Thresholds
  - Netting Rules
- CVA is calculated per “Netting Set” (nettable transactions between counterparties) – it is a portfolio measure

How does the CVA desk of a bank work?

- CVA desk Calculates Credit Charge, i.e. “T0 CVA”
  - Calculation of CVA pre-trade to adjust the bid/offer price to take into account credit riskiness of counterparty
- On execution of trade, Derivatives Market Maker pays Credit Charge to CVA Desk
- CVA value becomes a P&L item for the bank (in CVA desk)
- CVA desk continues to hedge CVA. Market Maker no longer carries counterparty risk, only carries market risk

CVA Hedging

- CVA is sensitive to counterparty credit spreads and underlying market prices for derivatives exposure. Banks calculate CVA Sensitivities for Hedging and P&L Explain

- Credit Risk Hedging:
  - CDS or CDS Index

- Exposure Hedging – Standard Market Instruments
  - Commodity Swaps, Interest Rate Derivatives, FX Derivatives

- Banks hedge CVA with highly collateralised counterparties

Importance of Collateral and Netting Agreements

- **CSA ("Credit Support Annex") defines Collateral Agreements**
  - Define type of Collateral (or no collateral at all)
  - Collateral might only kick in only at a threshold
  - Thresholds might be expressed in different currencies
  - Collateral thresholds might be rating dependent
  - Minimum Transfer Amounts reduce collateral posting frequency
  - CSAs might be specific to individual legal entities, individual asset classes or even individual trades

- **Netting Agreements** – Defines netting of trade exposures

Aspects of CVA Calculations in Banks

- Different Types - IFRS CVA, CVA RWA
- As a balance sheet item, CVA creates P&L and is included in Stress Testing (CCAR, EBA)
- CVA protects against deterioration of counterparty credit quality (if hedged); does not protect against actual default unless CDS hedge is exactly on the counterparty
- CVA encourages trading with fewer counterparties to net exposures. This might be counterintuitive for credit officers – to have smaller positions with diversified counterparties.

How to reduce Credit Charges?

- Maximise netting into highest quality counterparty
- Reduce complexity of CSA Agreements
- Increase collateralisation (Quantity and Quality of collateral)
- Use Listed Derivatives or cleared OTC
- Note: Increasing collateral posting will reduce Credit Charges but will increase cost of funding to provide collateral

Different Types of "XVA" and other Risks

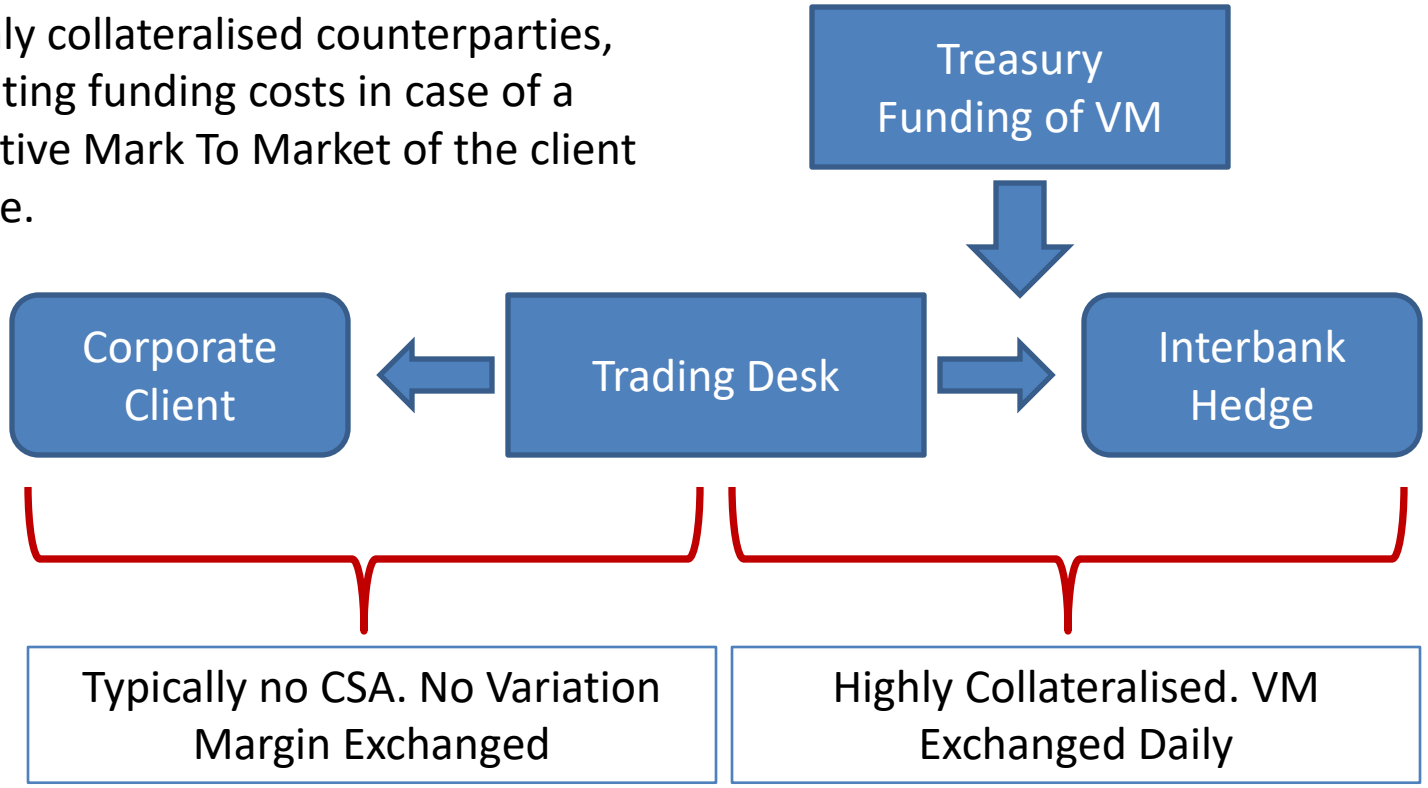
- Other Valuation Adjustments:
  - DVA – Risk of "oneself" defaulting
  - FVA – Cost of funding collateral posting
  - KVA – Cost of Capital (Hurdle)
  - MVA – Funding of Initial Margin in OTC derivatives

- MPOR (Margin Period of Risk) – Default Risk until next margin payment

- WWR (Wrong Way Risk) – Correlation between Collateral and Counterparty Default (e.g. Emerging market bank posts emerging market bond as collateral)

Why FVA for uncollateralised Transactions

A trading desk facing an uncollateralised client may hedge the position against highly collateralised counterparties, creating funding costs in case of a positive Mark To Market of the client trade.



Changes in OTC Market Structure since 2008

- Regulatory Response to Crisis
  - Mandatory Clearing for most liquid products
  - Margining for Uncleared OTC
  - Higher Capital requirements for banks

- Market Change:
  - Pricing of collateral / CSA
  - Pricing of counterparty risk
  - Pricing of funding cost

- It has become more expensive to trade OTC, in particular uncleared OTC

Q & A