Benefits and Costs of Active Counterparty Risk Management

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Counterparty Casino:
The need to address a systemic risk

By Jon Gregory
A (Seemingly) Random Example

• The leveraged super senior (LSS) transaction
  – Popular way of buying super senior protection pre-crisis
  – But the structure was so complex that it was almost impossible to assess the risk
  – Which was rather convenient
• History of CVA

• Why Manage CVA?

• The Benefits

• The Costs

• Future Trends
History of Counterparty Risk and CVA

CCR / CVA Timeline

In a few short years we have seen a paradigm shift in CCR with the transition from Passive to Active management of CVA that requires ever more accurate and more frequent CVA calculations – daily, intra-daily, and real-time.

Before CVA
- Firms apply credit limits and measures such as PFE (Potential Future Exposure) to limit their possible exposure to a counterparty in the future.

1999: Passive Management of CVA
- Large banks first start using CVA to assess the cost of counterparty risk.
- CVA is treated via a passive insurance style approach.

1998: Asian crisis and long-term capital management (LTCM). The unexpected failure of the large hedge fund LTCM and asian crisis lead to an interest in CCR although mainly confined to some first tier banks.

2006: New Accountancy regulations (FASB 157, IAS 39) mean that the value of derivatives positions must be corrected for counterparty risk.
- All banks must start calculating CVA on a monthly basis.

Sept. 10-15, 2008: Lehman Brothers collapses following a reported $4 billion loss and unsuccessful negotiation to find a buyer, one of Wall Street’s most prestigious firms files for bankruptcy protection.

2007: Active Management of CVA
- The Credit Crisis and resulting failures of high profile firms generates much more attention on counterparty risk.
- Banks are interested in more accurate and ever more frequent CVA calculations – daily, intra-daily, and real-time.

Source: Algorithmics
CVA (Credit Value Adjustment)

- CVA is the price of counterparty risk (expected loss) and is a **cost**

Risky Derivative = Derivative - CVA

- Crucial to be able to separate valuation of derivatives and their CVA
  (below formula assumes no wrong way risk)

\[
CVA(t) = (1 - \delta_C) \int_{t}^{T} EE(u) dPD_C(u)
\]

Percentage recovery value

Expected exposure including discounting (how much we expect to lose)

Default probability (how likely is counterparty to default at this time)
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The Birth of the CVA Desk

• Requirements to mark-to-market CVA in all derivatives positions

• This creates two obvious key problems
  – How to allocate the CVA across businesses / trading desks
  – How to avoid the volatility of all the CVA due to market movements (especially specifically credit spreads and volatility)

• Creates the need for an institution to have a specialised group to tackle this across all businesses
  – Transfer price CVA from point of origination
  – But will banks be better off trying to hedge their CVA?
  – Basel III and future changes in accounting practices may make this argument somewhat academic
CVA Trading is a Challenge

• Pricing
  – Must price via a transparent and industrialised methodology
  – Cannot reject trades without strong justification
  – Should give credit for all risk mitigants (netting, collateral, break clauses)

• Hedging
  – Management of a cross asset credit contingent book
  – Trade on only one side of the market
  – Some risks are not directly hedgeable
  – Wrong way risk causes negative gamma and cross gamma
CVA Charges Are Too High

• Most banks agree that a basic CVA calculation gives a “charge” that is simply too high
  – Corporate clients (for example) will not pay their entire credit spread in a CVA because banks have material credit spreads
  – Interbank market – cannot both charge for counterparty risk

• There are many ways in which the CVA is reduced (hidden?)
  – DVA
  – Ignoring CSA counterparties (CVA treated as zero even though it isn’t)
  – Use of a higher “ultimate” recovery (Lehman effect CDS auction recovery ~9%, ultimate recovery potentially up to 30-40%)
  – Central counterparties
  – Use of historical or blended default probabilities (does this suggest that some banks prefer not to dynamically hedge CVA?)
• History of CVA
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Motivation for CVA

• Risk management need
  – An institution should consider counterparty risk as with other financial risks
  – CVA should be priced into trades to avoid adverse selection (traders find it more profitable to trade with weaker counterparties)
  – Trading should be judged on profit **after** CVA has been accounted for
  – But banks find it hard to lose PnL / franchise value

• Financial accounting
  – Periodic CVA calculation to quantify fair value of derivatives for accounting purposes
  – But precise calculation not well-defined, different standards exist (e.g. IAS39, FASB157..)

• Regulation
  – Achievement of optimum regulatory capital relief through good management of CVA
  – No ambiguity around the Basel 3 requirements (but depends on implementation process)
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Regulatory Reaction to the Credit Crisis

• Stressed EPE
  – IMM Banks must calculate exposures using stressed market data

• Wrong way risk
  – Must identify “general” WWR and assume a higher exposure for “specific” WWR

• Systemic risk
  – Correlation multiplier (1.25) for large regulated / unregulated financial firm exposure

• Collateral.
  – A “margin period of risk” of 20 days must be applied for certain transactions

• Central counterparties
  – Risk weighting of 2% for CCPs which meet various rigorous conditions

• CVA VAR
  – Banks must hold additional capital to capture the volatility of CVA
CVA Risk Capital Charge (Basel III)

- CVA definition is based on spreads NOT default probabilities

\[
CVA \approx LGD_{mkt} \sum_{i=1}^{T} \max \left( 0; \exp \left( - \frac{S_{i-1}^{t-1}}{LGD_{mkt}} \right) - \exp \left( - \frac{S_{i}^{t}}{LGD_{mkt}} \right) \right) \left( EE_{i-1} D_{i-1} + EE_{i} D_{i} \right)\]

- Default probability term
- Exposure term

- What if we can’t find the spread of a counterparty?
  - “Whenever the CDS spread of the counterparty is available, this must be used. Whenever such a CDS spread is not available, the bank must use a proxy spread that is appropriate based on the rating, industry and region of the counterparty.”
  - This could become self-fulfilling when hedging with the index!
The Problems With CVA VAR

• Index hedges
  – Self-fulfilling with respect to mapping of credit spreads
  – Encourages procyclicality?

• Methodology
  – Intended to capture in a simple way the credit spread risk within CVA but gives no incentive for hedging other factors (IR, FX, …..)

• Motivation
  – OTC derivatives are relatively precisely valued, their VAR is much harder to quantify
  – CVA itself is hard to quantify so CVA VAR is surely a major challenge?
Unintended Consequences of CVA

“... given the relative illiquidity of sovereign CDS markets a sharp increase in demand from active investors can bid up the cost of sovereign CDS protection. CVA desks have come to account for a large proportion of trading in the sovereign CDS market and so their hedging activity has reportedly been a factor pushing prices away from levels solely reflecting the underlying probability of sovereign default.”

Bank of England Q2

- CVA desks with similar hedging requirements
  - Extreme moves in a single variable (e.g. spread blowout)
  - Sudden change in co-dependency between variables (creating cross gamma issues)
  - At this point do we stop hedging bear the pain?
Central Counterparties
Functions of a CCP

• Pricing, market data
  – CCPs provide the valuation of the relevant the OTC derivatives
  – This limits the complexity of the derivative

• Netting / trade compression
  – CCPs can give lower margin requirements for offsetting trades

• Collateral management
  – A CCP performs the collateral management function by making margin calls

• Insurance / Mutualisation
  – A CCP provides insurance via loss mutualisation process where any loss caused by
    the default of a CCP member is absorbed by all other CCP members

• Auction process
  – In the event of default of a member, a CCP will auction their positions
  – CCP members are normally required to participate in this auction
Can a CCP Fail?

Impact of 1 or more members defaulting
- Value of positions of those members

Closeout period

Loss

- Closeout trades
- Variation margin
- Initial margin
- CCP Reserve Fund and other contributions
- Additional contribution from CCP members
- Liquidity Support or CCP Fails
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What Can We Do With CVA?

• Basel III forces banks to price and manage CVA actively - what can you do?

• Trade out of CVA?
  – Hedging - possible but limited single name CDS market makes this difficult
  – Securitize it – might not be an easy idea to sell to the regulators

• Take more collateral?
  – Converts CVA into funding liquidity risk and residual unhedgeable “gap risk”
  – Limitations over counterparties who can sign CSAs (e.g. corporates, sovereigns)

• Trade through central counterparties?
  – More funding requirements than CSAs
  – Then the CCPs take all the CVA and creates a new too big to fail problem
## Benefits of Collateral

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<th>Uncollateralised (No CSA)</th>
<th>Collateralized (2-way CSA)</th>
<th>Overcollateralized (CCP)</th>
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<td>CVA</td>
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Conclusion

• Hedging according to Basel III, CSAs and Central Counterparties all convert CVA into other risks (funding, liquidity, gap, systemic, ……)

• Like the LSS trade, all these things make the underlying risk more complex and hard to quantify

• Key focus will be on balancing
  – how best to manage CVA from a purely economic point of view
  – how best to manage CVA from a regulatory perspective

• CVA VAR and CCPs do not obviously provide a sound alignment of the above