Challenges in Managing Counterparty Credit Risk

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Counterparty Casino:
The need to address a systemic risk

By Jon Gregory
The Role of a CVA Group
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

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

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

Source: Algorithmics
Why a CVA Group?

• 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 (specifically credit spreads and volatility)

• Creates the need for an institution to have a specialised group to tackle this across all businesses
  – Cross asset focus
  – Mostly trading (not risk management) driven
CVA
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)

\[ CVA(t) = \left(1 - \delta_C\right) \int_t^T EE(u)dPD_C(u) \]

- 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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- **Expected exposure including discounting (how much we expect to lose)**
- **Default probability (how likely is counterparty to default at this time)**
But CVA is Very Complex

• CVA represents an option on an underlying derivative
  – CVA calculation always harder than pricing the derivative itself

• Need the default probability (and recovery rate) of the counterparty
  – Often market implied probabilities are not known (no CDS market)

• Derivatives are subject to netting agreements
  – Need to price all other trades with this counterparty as well as trade in question
  – All correlations (same asset class, cross-asset class must be known)

• Wrong way risk
  – Linkage between default probability and exposure at default

• Collateral agreements, break clauses etc
CVA Trading is a Challenge

• Management of a cross asset credit contingent book
• Trade on only one side of the market
• Should give credit for all risk mitigants (netting, collateral, break clauses)
• Hedging CVA is challenging and often simply not possible
Trading Book CVA?

- CVA is a market price *by association* to the underlying OTC derivative
  - Consistent with derivatives valuation
  - But trading function for CVA is very difficult to run
  - Hedging is extremely difficult or impossible

- Derivatives are essentially exotic loans and so *by association* some CVA could be treated outside the trading book
  - Consistent with loan book management
  - Pricing / provisioning / regulation is easier
  - Little or no hedging required

- Insisting on the market approach may just lead to worse problems
Active Management 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
The Growing Use of DVA
CVA for CSA Counterparties

10-day remargin period assumed
Collateralised CVA Example

<table>
<thead>
<tr>
<th>Assumption</th>
<th>CVA (bps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-day remargin period</td>
<td>0.51</td>
</tr>
<tr>
<td>+ Minimum transfer amount of 0.5%</td>
<td>0.69</td>
</tr>
<tr>
<td>+ Threshold of 1.0%</td>
<td>1.57</td>
</tr>
<tr>
<td>No collateral</td>
<td>2.79</td>
</tr>
</tbody>
</table>
Unilateral CVA in the Old Days

<table>
<thead>
<tr>
<th>Credit Rating</th>
<th>Credit spread (bps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Aa1/AA+</td>
<td>10-15</td>
</tr>
<tr>
<td>Corporate A3/A-</td>
<td>200-300</td>
</tr>
</tbody>
</table>

- Bank has no default risk
  - Bank charges corporate unilateral CVA
  - If corporate asks for banks default probability to be taken into account, they get laughed at
- No CVA charges in interbank market (collateralised, banks won’t default)
- When bank credit quality deteriorates, market becomes gridlocked
Pricing Bilateral Counterparty Risk

Bilateral CVA considers also an institution's own default (this formula assumes independent of defaults)

\[ BCVA(t) = (1 - \delta_C) \int_t^T EE(u)[1 - PD_I(u)]dPD_C(u) \]

CVA

\[-(1 - \delta_I) \int_t^T NEE(u)[1 - PD_C(u)]dPD_I(u) \]

DVA

Own percentage recovery value

Expected exposure

Probability we haven't yet defaulted

Probability counterparty defaults

Negative expected exposure

Probability counterparty hasn't yet defaulted

Probability we default

Jon Gregory (jon@oftraining.com), Credit Risk Summit, London, 14th October 2010
How to Realise DVA

• Go bankrupt
  – Usually not a popular choice

• Unwinds or novations
  – An institution may realise a DVA gain if a trade is unwound in the future (e.g. banks unwinding transactions with monolines)

• Hedging
  – DVA much harder to hedge than CVA - cannot sell CDS protection on yourself!
  – Buy back your own debt (not really a dynamic hedge) – do you have the cash?
  – Sell CDS on another counterparty (who is highly correlated with you) – give wrong-way risk to buyer of protection – careful who you choose (Lehman)

• Funding arguments
  – Double counting of DVA and funding
Regulatory Aspects
Regulatory Reaction to the Credit Crisis

• BCBS Committee (Dec 2009)
  – …. where current treatment did not adequately capitalise for risks during the crisis 😊

• Key problems identified
  – Capitalisation of CVA volatility (2/3 of counterparty risk related losses during crisis?)
  – Initial margining (capital to give incentive for adequate initial margin through cycle)
  – Central counterparties not utilised
  – Close-out periods
  – Interconnection of financial institutions
  – Lack of back-testing and stress testing
  – Wrong-way risk
The Problems With CVA VAR

• Recent changes
  – Remove the multiplier of 5 (scaling from 10 days to 1 year) 😊

• Only single name hedges (CDS, CCDS) given capital relief
  – Now seemingly will give some relief for index hedges
  – But how? And will this not be encourage procyclicality?

• Methodology
  – Intended to capture in a simple way the credit spread risk within CVA
  – Actually, it is not the optimal way to do this and can lead to non economic results (Rebonato et al.)

• 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?
Central Counterparties
CCPs

- Closeout all positions with member in default
- Liquidate collateral of member in default
- CCP Reserve Fund and other contributions
- Possible additional contribution from CCP members

Probability

~99% confidence level?

~99.97% confidence level?

Loss