Counterparty credit risk uncovered - part four

Terri Duhon, managing partner at B&B Structured Finance and author of 'How the Trading Floor Really Works', discusses managing counterparty credit risk including the use of reserves (i.e. CVA)

Counterparty credit risk is a dynamic and complex risk that needs to be managed daily – not only because it changes as new trades are done with counterparties new and old every day, but also because it changes with market moves. In order to initially quantify the risk that needs to be managed, a dealer needs to assess the market risk and the credit risk components independently and then look at them together.

The assessment of market risk of the derivative itself is what gives the dealer a graph of potential future exposure. In the first three articles in this series, we identified the graphs for the major contributors of counterparty credit risk – interest rate swaps, credit default swaps and cross-currency swaps.

The assessment of the credit risk of the counterparty is what gives the dealer a probability of experiencing a loss. When we combine the magnitude of the potential future exposure for each derivative transaction with the probability of default of the counterparty, we can then understand the magnitude of the risk dealers need to manage.

Overlaying all of this is an assessment of whether the market risk of the derivative is adversely correlated to the credit risk of the counterparty (that is, wrong-way risk, discussed in SCI on 31 May), in which case the magnitude of the counterparty credit risk is larger.

All of this is an assessment that the dealer does on the day it enters into a derivative with a counterparty. It does this primarily to assess the amount that the trading desk is going to have to reserve against counterparty credit risk.

The amount to reserve can be simplified by looking at the average potential future exposure as a loan to the counterparty. The amount that needs to be reserved is the credit spread for the counterparty that the dealer would receive, had the dealer given a loan to the counterparty.

Using the simple example from the first article in this series (SCI 3 May), we had a US$100m five-year swap with an average potential future exposure of 2% and a counterparty five-year credit spread of 50bp. The dealer should reserve 50bp on US$2m to hedge the counterparty credit risk.

This works out to a cost of approximately 1bp running on the full US$100m notional of the swap. In theory, this should widen the dealer's bid-offer by 1bp on either side.

The present value of 1bp running on US$100m is both a charge to the client via the widening of the bid-offer and a reserve for the dealer's trading desk. We can roughly think of this amount as

the credit value adjustment (CVA). And, in theory, the trading desk should pay that amount to the CVA desk.

CVA is a relatively new term mostly associated with Basel regulations, which require regulatory capital to be set aside for the management of counterparty credit risk.

Thus, there is a CVA desk within each bank that receives CVA reserves in order to manage the counterparty credit risk across products, asset classes and counterparties. What this means is that a dealer doesn't just analyse a trade with a counterparty on a stand-alone basis; it analyses the trade taking into account all the other derivative trades it's done with the counterparty, as well as the collateral agreement in place with the counterparty (this is the Credit Support Annex or CSA) and then it calculates a CVA.

For example, a dealer executes only one five-year IRS with a new counterparty where the dealer pays fixed. The CVA is 1bp running on the notional, as calculated above.

The following week, the dealer executes a second five-year IRS on the same notional with the same counterparty, but this time the dealer receives fixed. Logically, rather than create a new CVA charge, this should release CVA because the dealer is now effectively hedged on the market risk of the original swaps with the same counterparty.

But what about the situation where the counterparty wants to pay fixed on a second swap with a three-year maturity rather than a five-year maturity? Or pay fixed on a euro-denominated swap rather than a US dollar-denominated one?

This is where netting of potential future exposures becomes trickier. Even more complicated is thinking about netting potential future exposures between IRS and CDS. Intuitively, there should be some benefit due to diversification of exposures across asset classes, but we are back to making assumptions.

So far, we've considered the analysis the dealer does on day one of the trade. Now let's consider the analysis that the dealer needs to do every day that the trade is in existence.

In fact, it is the same analysis that's already been done. The dealer just updates its calculations from day one with a trade that is successively shorter by one day and with a new market environment, where interest rates may be higher or exchange rates have moved.

While we can generally assume the trade was done at a fair market value on day one and thus as close to zero mark-to-market, after day one we are dealing with a trade that has a mark-to-market. Thus, we have a new starting point for our potential future exposure graph.

In the case that the dealer has a positive mark-to-market, it is possible that the magnitude of the potential future exposure is higher than we original calculated on day one and vice versa when it is negative. This is the dynamic nature of the risk management.

Now the dealer takes into account the collateral management. If there is a positive mark-to-market and the counterparty posts collateral to cover that amount, then the potential future exposure that it is now managing looks similar to the original potential future exposure profile because the dealer can simply subtract the collateral posted.

For example, imagine that the mark-to-market of our original IRS trade is now 1% of the notional on day two of the trade. All else being equal, the average potential future exposure will now be close to 3% rather than 2%. But if the counterparty posts 1% of the notional as collateral, then the 'loan' exposure is reduced from 3% to 2%.

Again, it's not this simple, as there are a variety of ways to structure a collateral arrangement – including non-zero thresholds and ratchets for ratings. Regardless, when the dealer looks at the exposure at the level of an individual counterparty, these are the considerations it must make.

The CVA desk is often looking at the counterparty credit risk on a more macro basis. The idea is that if interest rates shift in a particular direction, how will that impact the potential future exposure of the entire book of counterparty credit risk? In other words, what is the interest rate sensitivity and how can it be hedged (should the dealer even be hedging it)?

The second sensitivity analysed is credit spreads. When they widen, what happens? Should credit spreads be hedged and, if so, how? The same gets done with FX rates and various other market inputs.

In other words, the CVA reserve could be thought of as a cost of hedging either the individual counterparty credit risk or the macro risk of the global derivatives book.

The counterparty credit risk is dynamic and complex. It requires analysis of market risk, credit risk, correlation risk and the individual collateral agreements made with each counterparty. It also requires some assumptions in order to think about how to net potential future exposure across products with a single counterparty.

Finally, it requires a lot of judgement about the reserving and hedging of the risk, particularly given its dynamic nature. Taking this all together, it is no wonder that many banks were far behind in their management of this risk and that there is much to debate today about the 'right' way to do it.

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