Centrus

Modern Finance

Introduction to CVA/DVA

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Before the financial crisis, the credit risk on derivatives were mostly considered insignificant. This was a view that was quickly revised when risks increased and traders started adjusting the values quoted on derivatives from counterparty to counterparty, and so market prices began to diverge.

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Derivative valuations adjustments - holistic view

Before the financial crisis the credit risk onderivatives were mostly considered insignificant, - a view that was quickly revised when risks increased and traders started adjusting the values quoted on derivatives from counterparty to counterparty, and so market prices began to diverge. Naturally this evolved into calculating "valuation adjustments" from the mid-market price as part of trading to account for the credit risk of the counterparty with whom you were trading with. The calculation of these adjustments became standard among banks and regulation subsequently required them to be included as part of the fair value of derivatives within financial statements.

More recently, with the introduction of IFRS 13, the concept of "non-performance risk" within fair value was included within the accountancy standards of any corporates who had elected up to IFRS standards. Non-performance risk covers anything that could influence the likelihood of an obligation being fulfilled. For derivatives the credit risk is one of the more prominent nonperformance risks but is not the only risk.

In addition, the methodologies required to quantify such risks are not trivial. In addition to the value of these adjustments significantly impacting the purchase price of a derivative, from banks or counterparties factoring them into the value, on restructure the change in the value of these adjustments can often be the value-driver for the cost borne or savings received e.g. as the new restructured trade may have greater valuations adjustments which would be a cost to the restructure or lesser adjustments which would be a release to the restructure.

This paper aims to summarise the leading valuation adjustment calculation methodology and briefly explain and summarise the key valuation adjustments produced.

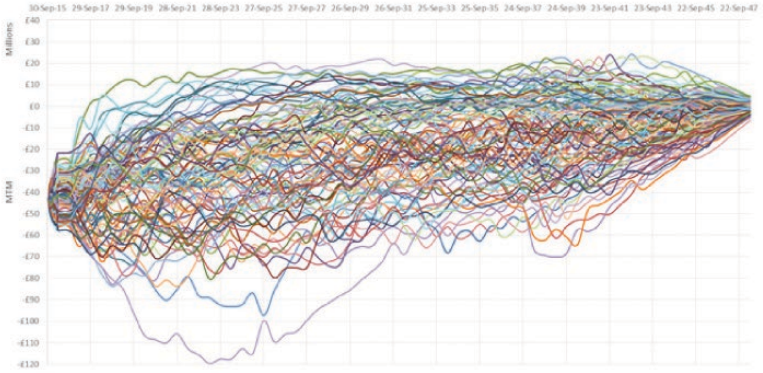
Core Valuation Adjustments: Credit Valuation Adjustment (CVA)

CVA encompasses the credit risk of your counterparty to you. The size of your credit risk is dependent upon the size of the exposure that you have with your counterparty such as a bank. If the value of a large derivative position with a bank is positive (in the money) then it is saying that the future cashflows on the obligation is likely to be valuable to you given current market expectations of future market conditions. If your counterparty were to default then you could potentially lose the value of these cashflows.

If current markets rates and expectations of future market rates were to change such that the obligation became negative to you (out of the money) then there will be very little credit risk as you're not expected to receive a benefit from the obligation, so the counterparty defaulting would not be a concern, however a credit risk would still exist as, right up until the maturity of the contract, as there is always the chance that market rates change again so that the obligation becomes in your favour again.

From this we can see that possible movements in the market can be important. It is common to calculate the possible future values of the obligation to the client by running scenarios in order to model how the value of the derivative may change based on market expectations of future volatility. The same methodologies can be used as market option pricing and tens of thousands of simulations can be run to show how the derivative valuation may change under different market circumstances, an example of this charting 100 paths of such a calculation is below:

Risk management process – building a framework and implementing a strategy



"The debit valuation adjustment is the impact of your credit risk on the value of a derivative."

Once the likely future exposure on the obligation has been calculated:

- The likelihood that any positive value might be lost is derived.
- Then the percentage of value that is assumed to be recoverable in a default scenario is removed from the calculation, to produce the loss in event of default amount (Loss Given Default – LGD).
- The LGD is then adjusted by the probability of whether or not the default might occur. The default probability is normally implied from market trading of the counterparty's credit spread.
- The probability adjusted loss is then discounted to today to produce the present value of the risk, which is the amount by which the derivative's value should be adjusted.

This is a broad overview of a full CVA calculation methodology however there are many factors within the process that can impact the credit risk produced such as:

- the impact of collateral held against a counterparty
- netting between trades with a counterparty
- the impact of your own default on your counterparty exposure.

Simplified approximations of the method described here are available in the market; which rely heavily on the assumptions applied.

Debit Valuation Adjustment (DVA)

The debit valuation adjustment is the impact of your credit risk on the value of a derivative (which would be the CVA from the perspective of your counterparty looking at you). Some people find the concept counterintuitive, especially as the movement in DVA often offsets movements in the value of the derivative, so that when the value of the derivative decreases there's an increase of the DVA through the financial statements. There are, however, some strong arguments for DVA to be included in the derivatives fair value. The first argument is that the DVA is necessary in
order to get an equal view of the derivative from both counterparty's point of view and so arrive at a single mid-market price for the derivative, from which the pre-CVA/DVA value is normally derived.

The second argument is that the DVA has always been included when pricing a bond and so this can be viewed as an extension to derivatives. DVA can be most easily seen at issue when a spread to the coupon is added to account for your own credit risk. Subsequent trading in the bond takes into the value of the issuer's credit risk in calculating the traded price, which is very similar to a DVA. The reason that a bond doesn't exhibit CVA is due to the fact that the flows after issue are always to the investor and never from the investor and so there is no investor risk.

The third argument, is that in financial statements if there were to be a self-default on a derivative obligation then only the amount that can be recovered would be paid. The amount written off can be viewed as a benefit to the bondholders.

Bilateral Valuation Adjustment (BVA)

BVA = CVA + DVA and is used as a short hand reference for the two adjustments added together.

Funding Valuation Adjustment (FVA)

Funding valuation adjustment is heavily debated in the market and a standard calculation methodology is still being worked towards.

Derivative obligations will normally have a funding impact on a firm, which is normally a benefit (FBA) or a cost (FCA). The funding valuation adjustment aims to capture this impact but, given that a firm normally funds at a risk free rate plus it's own credit spread plus additional factors such as new issuance premium, liquidity premium etc, there's clearly an incomplete overlap with the DVA calculation where the additional factors can be difficult to quantify.

Other valuation adjustments

Collateral Valuation Adjustment (COLVA) It is common for one or both counterparties to post collateral against the current market value of a derivative in order to reduce the

counterparty risk against the counterparty. The impact of collateral needs to be taken into account when calculating the CVA/DVA and often significantly reduces the magnitude of one or both of the adjustments. Often collateral is posted infrequently, or only when the market value exceeds a certain value, and so in practice credit risk often still exists in the presence of collateral. The impact of collateral can just be included in the final value of CVA/DVA or can be separated out into a separate COLVA adjustment. In the market it can often be the case that securities other than cash can be used instead such as gilts, treasury bills or other assets which can warrant a more sophisticated calculation of COLVA.

A Word on Discounting

It is normal to receive interest on cash collateral posted to a counterparty; as the counterparty will invest the money in the overnight market* on your behalf. For collateral overnight is the maximum length of time the money can be invested as the market rates may change and the collateral could need to be returned the next day. In some instances a counterparty is able to borrow money in the overnight market to fund the collateral posting. It is therefore normally assumed that collateralised swaps are funded using overnight and therefore the value of the swaps should be derived by discounting at OIS rates. This has been a change from methodology used before the crisis when most market participants discounted at Libor rates however this change is supported by market theory in the fact that OIS rates are closer to a "risk free" rate than 3m/6m Libor as one is more easily able to take a position on whether a counterparty is going to be around tomorrow in the overnight market over whether a bank is going to be solvent in 3m/6m time. In the past it has also been the market convention to discount uncollateralised derivatives at libor however, while it is recognised that OIS + XVA is more appropriate, calculation of CVA/DVA results are computationally complex when performed accurately and are not yet required under all accounting standards. Until CVA/DVA adjustments more widely applied and the discussions around FVA alluded to above are resolved, many market participants have chosen to continue to use the libor discounting assumptions in many situations, in line with past calculations.

*e.g. "Sonia" is the daily average rate of GBP deposits made in the overnight market. This is treated as an index within derivatives such as the overnight index swap "OIS" where a 3m OIS swap exchanges a fixed amount in 3 months (e.g. £100 at 0.5%) for the compounded cumulative return from investing (e.g. £100) in the overnight market each night at the overnight average rate for 3 months.

Capital Valuation Adjustment (KVA)

Basel regulation requires banks to hold capital against their derivative exposures. The incremental cost of holding the regulatory capital against a trade is encapsulated by the KVA and, while a real cost to the bank, is very hard to estimate and varies from counterparty to counterparty and from one regulatory environment to another.

Margin Valuation Adjustment (MVA)

MVA covers the remaining credit risk after margin payments on derivatives cleared through a central clearing house, but otherwise is very similar in calculation to COLVA.

XVA

XVA is the sum of all the adjustments applied to a trade e.g. CVA + DVA + FVA + KVA +....

Contacts

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Centrus Analytics provides leading solutions in systems, reporting and independent valuations to empower treasury departments to focus on value than automatable tasks. As companies are increasingly pressured from stringent accounting requirements, demanding derivatives regulation and greater volatility in underlying markets, so they look to receive more debt and derivative valuations from independent sources, rather than bank counterparties. Centrus Analytics support clients through this process to achieve consistently accurate valuations, using a sophisticated technology solution combined with debt and derivatives advisory expertise and access to high quality market data.

We have the systems capability to model derivative portfolios and the technical expertise to use financial analytics to accurately measure Credit Valuation Adjustment (CVA) and Debit Valuation Adjustment (DVA) values.

About Centrus

Centrus is an independent financial services group that believes in a better way of doing business. We specialise in corporate finance, analytics and investment management and are united by a culture that values imagination, energy and purpose.

We believe this can unlock significant value for our clients and their communities. Above all, we're working towards a more modern financial landscape. It is a simpler and more responsible way of doing business by delivering real money and tangible benefits to the real economy.

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