xVA goes mainstream

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1. Introduction

Traditional derivatives pricing and valuation generally considered only the impact of cashflows. For simple transactions, this problem was always considered relatively straightforward and often simply a question of applying the correct risk-free discount factor. Valuation was only considered difficult where cashflows were themselves more complex, such as being non-linear, contingent or multidimensional. These more complex payoffs or "exotics" were difficult to value but the more vanilla equivalents were assumed to be relatively trivial.

Recent years have increasingly shown that the above assumptions do not hold, as credit risk, funding, collateral and capital have all been viewed as having a significant impact on the valuation of all derivatives. The general term "xVA" has been used to classify a variety of valuation adjustments (VAs) that consider these aforementioned factors.

The role of xVA can be represented as:

$$V_{actual} = V_{ideal} + xVA. \tag{1}$$

This allows the actual value (V_{actual}) to be represented as some ideal value (V_{ideal}), together with the relevant valuation adjustments. The valuation adjustments - although not strictly speaking mutually exclusive - are often defined as CVA (credit), FVA (funding), ColVA (collateral), KVA (capital) and MVA (initial margin).

There are several reasons why the above separation makes sense:

- *Complexity.* As suggested by the name, V_{ideal} in the above representation may be a relatively simple calculation, perhaps only reflecting the valuation of the cashflows as in the traditional approach. It may also conform to a certain type of transaction (for example, one that is centrally cleared[1]). On the other hand, the xVA components are orders of magnitude more complicated and require knowledge of contractual terms together with the economic impact of credit, funding, collateral and capital.
- *Additivity.* Whilst the ideal valuation is likely to be additive across transactions, xVAs are generally portfolio level calculations. Hence, whilst ideal valuations can be made at the transaction level, xVA terms must be calculated in a more portfolio-driven framework.
- *Organisation.* Whilst the idealistic, cashflow-driven valuation is suited to separate trading desks specialising in, for example, asset class, market, type of client or region, the xVA component necessitates management by a single desk. Such a desk is often known as the "xVA desk" or "central desk".
- *Accounting and regulatory.* The xVA world is very much driven by specific accounting and regulatory requirements that impact the way in which various terms are treated. Knowledge of these requirements is a critical aspect of xVA quantification.

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[1] At least from the central counterparty point of view.

2. xVA as a bespoke adjustment

In the above representation, xVA can be seen as a nuisance. Suppose a bank carries out transaction with a client and hedges it "back-to-back" by executing the exact reverse transaction with another bank. If all valuations can be based on some simple version of V_{ideal}, ignoring xVA, then the bank may appear market risk neutral and can easily lock-in profit margin without any major problems. However, this situation is not market risk neutral due to the presence of xVA components on the transaction and its hedge which are unlikely to be symmetric.[2]

Further to the above, there is another fundamental reason for the separation of xVA into a distinct component. In general, most xVA components are costs and, as such, represent a negative drag on return on equity. Taking a short-term view, it is often advantageous to ignore them if possible. Whilst a complete disregard is not practical under current accounting and regulatory requirements, it is possible in certain situations. For example, a bank may not calculate the CVA for certain "collateralised counterparties" especially if the underlying thresholds in the collateral agreement are zero. Whilst it is generally accepted that the credit risk in such transaction is material[3], it is often not possible to charge CVA in these situations (for example, since they are interbank transactions). This means that the treatment of the value using only V_{ideal} is more convenient and prevents the nuisance of non-chargeable valuation adjustment costs.

In fact, the question of whether to value xVA stems - to a large extent - from whether or not it can be included in the price. Consider the usage of FVA compared to MVA for assessing funding costs of derivatives. Whilst accounting rules do not require explicit representation of these terms in valuation, banks have been proactive in including FVA adjustments as a deduction to the fair value of derivatives. On the other hand, there has not been as much attention put on the costs of initial margin (MVA) for centrally cleared and some bilateral derivatives transactions.[4] One possible interpretation of this is that FVA can readily be charged to uncollateralised "end-user" type clients whereas MVA, arising more from interbank hedges, cannot.[5]

Another example of the benefit of the separation is apparent when considering regulatory capital implications. Under the current regulatory regime, there is a CVA capital charge for the market risk of CVA which is separate from other market risk capital charges. This capital charge recognises only certain credit default swap (CDS) transactions as eligible hedges, therefore providing capital relief. Any other CVA hedges are non-eligible and may[6] therefore need to be included in the standard market risk capital calculation; this means they are capital *consuming* rather than capital *reducing*. Hence, current regulation - to a large extent - actually encourages banks to treat xVA as an ad-hoc adjustment, and focus on managing the market risk of V_{ideal} to avoid capital charges from CVA hedges.

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[2] In a CVA/DVA only world, there is the possibility of valuation symmetry but components such as FVA and KVA create clear asymmetries here.

[3] For example, see L. B. G. Andersen, M. Pykhtin and A. Sokol, 2016, "Rethinking Margin Period of Risk", working paper.

[4] At the current time, only bilateral derivatives between the largest dealers are subject to initial margin requirements.

[5] Note that as smaller banks and other financial institutions are subject to bilateral initial margin posting then large banks will be likely to start to charge MVA to these counterparties.

[6] Some regulators, notably the US and Canada, have provided an exemption for this point.

3. xVA as an integrated component

However, representing value in Equation (1) can be problematic. Take the funding of uncollateralised transactions and FVA as an example. One potential approach would be to represent all derivatives via a standard V_{ideal} (for example using OIS discounting) and then make separate FVA adjustments. Uncollateralised transactions would have significant FVA components whilst collateralised ones would have minimal or no FVA. However, the problem with this approach is that a bank would appear market risk neutral due to the symmetric nature of V_{ideal} for hedged transactions. Hence, any FVA hedges (similarly to CVA hedges currently as discussed above) would potentially consume capital.

One way to avoid this problem potentially is to represent FVA as an integral part of uncollateralised transactions rather than an explicit valuation adjustment. Loosely speaking, this could involve discounting uncollateralised transactions at a rate including an unsecured funding cost. This would not appear market risk neutral against any hedges (which would likely be collateralised and so discounted at the collateral rate without additional funding costs). Any FVA hedges could then neutralise this market risk. This treatment is not perfect and does not deal with, for example, partially collateralised transactions[7] but is probably the most practical.

4. The move to mainstream

We can see that currently there are different pros and cons to treating xVA terms as either bespoke valuation adjustments or integrated components of value. This is perhaps not surprising given the industry is still discovering and understanding aspects around defining and calculating xVA. However, it should be expected that as time goes by xVA will become more mainstream and less arbitrary and bespoke.

For example, in 2015, the Basel Committee on Banking Supervision published a proposed change to the CVA capital charge.[8] This outlines a methodology for CVA capital broadly consistent with the incoming Fundamental Review of the Trading Book (FRTB) rules for market risk. The more advanced version of the new CVA methodology allows CVA capital to be driven by a bank's accounting CVA model (albeit with several conditions imposed). For a bank to have approval to use this more advanced approach they must have a "dedicated CVA risk management function". Without such approval, a bank must use a more basic approach to calculate its regulatory CVA capital which is likely to result in a significantly higher requirement. The result of this is that banks with significant derivatives positions aspire to the more advanced approach.

The implication of the FRTB-CVA capital rules is that, unlike now, a bank is incentivised to manage the market risk of V_{actual}, thereby embracing CVA as an integral part of the valuation. This will minimise the cost of capital since CVA hedges will generally be capital reducing. This clearly makes CVA a more integral part of valuation and less of an ad-hoc adjustment.

Hence, it can be seen that CVA will continue on a path to being less of a bespoke adjustment and more an integral part of value. It would seem likely that the other xVA adjustments will gradually follow. Hence, xVA – as the core of derivatives valuation – is becoming increasingly mainstream.

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[7] It furthermore assumes a completely symmetry of funding costs and benefits which most banks probably do not feel is completely warranted in all market conditions.
[8] Basel Committee on Banking Supervision, 2015, "Review of the Credit Value Adjustment Risk Framework", July. www.bis.org