



**SOLUM
FINANCIAL**
DERIVATIVES ADVISORY



Funding Valuation Adjustment Solum Survey December 2014

SOLUM FINANCIAL
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1. Introduction

Executive Summary

Since the publication of the two Solum Counterparty Risk Surveys in 2010 and 2013, counterparty credit risk management has evolved materially, with the market steadily coming to a consensus with respect to the valuation of CVA and DVA – a consensus partially driven by accounting and regulatory considerations.

In this next phase of the now ever-changing landscape of derivative pricing, many banks routinely incorporate funding related adjustments. In the absence of policymaker guidance similar to that now in place for CVA and DVA, the market practice with regard to Funding Value Adjustment (FVA) can vary markedly from one bank to the other. The purpose of the present survey is to shed some light on such market practice and to highlight major trends and nascent consensus where one can be established.

As of the end of 2013, eight banks were reporting FVA in their books and records. Our survey highlights slow, but steady adoption of funding adjustment as a fully incorporated component of derivatives pricing, with half of the survey sample recognising FVA in their books and records (which has resulted in a number of high profile one-off announcements by large institutions as they acknowledge previously unrecognised FVA), and many more incorporating it as a pre-deal pricing component. Banks already have to report DVA, and this inclusion of credit spreads overlaps with funding spreads to some extent. An important motivation for broad FVA adoption is that banks increasingly want to be able to incorporate the funding costs to offset the funding benefit they already recognise via their DVA to a certain extent.

However, pricing and risk mitigation methodologies, operating models and interactions with a broader set of issues such as collateral management are still far from settled, reflecting a wide range of risk management preferences and philosophical interpretations of funding as a derivatives pricing component.

From the survey responses, it appears that the scope of the FVA mandate above and beyond straightforward derivative funding risk seems to be evolving to cover other aspects of funding, with the most widespread inclusion being contingent funding for downgrade events. These responsibilities will only intensify with the modelling sophistication adopted by banks to account for collateral optionality, and with the growing regulatory-driven importance of centrally cleared trades (and their associated margin and collateral requirements). While collateral responsibilities remain split between the FVA desk, the collateral management group, or a dedicated collateral optimisation team, a clear desire to evolve towards a full alignment between the collateral decision-making process and pricing assumptions is emerging from the survey responses.

From an operating model standpoint, this growth in both size and scope of risk management responsibilities related to derivative valuation adjustments is increasingly being resolved through the introduction of centralised xVA risk management. This can take the form of a coordinated approach where the CVA trading desk adds FVA to its other duties or a more comprehensive approach where risk management is the remit of a comprehensive xVA desk, which includes but is not strictly defined by its initial CVA mandate.

As the range of responses to the survey questions illustrates, pricing methodology differences can explain the discrepancies that market participants observe with respect to derivatives pricing. While the uncertainty around FVA market practice is a large component of such discrepancies, pricing adjustment arising from capital cost (a valuation adjustment informally known as KVA) was the most commonly cited factor (in terms of how it is calculated and/or passed on to clients).

Despite CVA and DVA calculation uncertainty being increasingly in the rearview mirror, considerations related to funding issues are both topical and substantial, as highlighted in this survey. Combined with possibly larger valuation adjustments (such as KVA), xVA is likely to remain a source of continued challenges for banks, from an operational, accounting, regulatory and risk management perspective.

Survey Methodology

This survey examines in detail current (but evolving) FVA practices, the importance of FVA as a pricing component, its accounting treatment, its calculation methodologies and the various operating models banks have adopted to risk manage derivatives funding risk.

Solum Financial prepared a series of 22 questions to cover the topic as comprehensively as possible. The questionnaire was only submitted to banks with a comprehensive FVA framework used systematically by the front office.

Solum Financial surveyed a target group of 20 banks (Q3 2014) and their responses were given as a current state of the situation that existed at the time of the survey. Solum Financial notes that subsequent changes may have occurred.

Answers received were compiled by Solum Financial and these results are published on an anonymous basis.

Glossary

CCP	Central Counterparty
CDS	Credit Default Swap
CSA	Credit Support Annex
CTD	Cheapest-to-Deliver
CVA	Credit Valuation Adjustment
DVA	Debt Valuation Adjustment
ENE	Expected Negative Exposure
EPE	Expected Positive Exposure
FBA	Funding Benefit Adjustment
FCA	Funding Cost Adjustment
FVA	Funding Value Adjustment
KVA	Valuation Adjustment with respect to Regulatory Capital
LCR	Liquidity Coverage Ratio
MTA	Minimum Transfer Amount
MTM	Mark-to-Market
NSFR	Net Stable Funding Ratio
OIS	Overnight Index Swap
xVA	Derivatives Valuation Adjustment (includes all of CVA/DVA/FCA/FBA/KVA/etc...)

2. Pricing Considerations

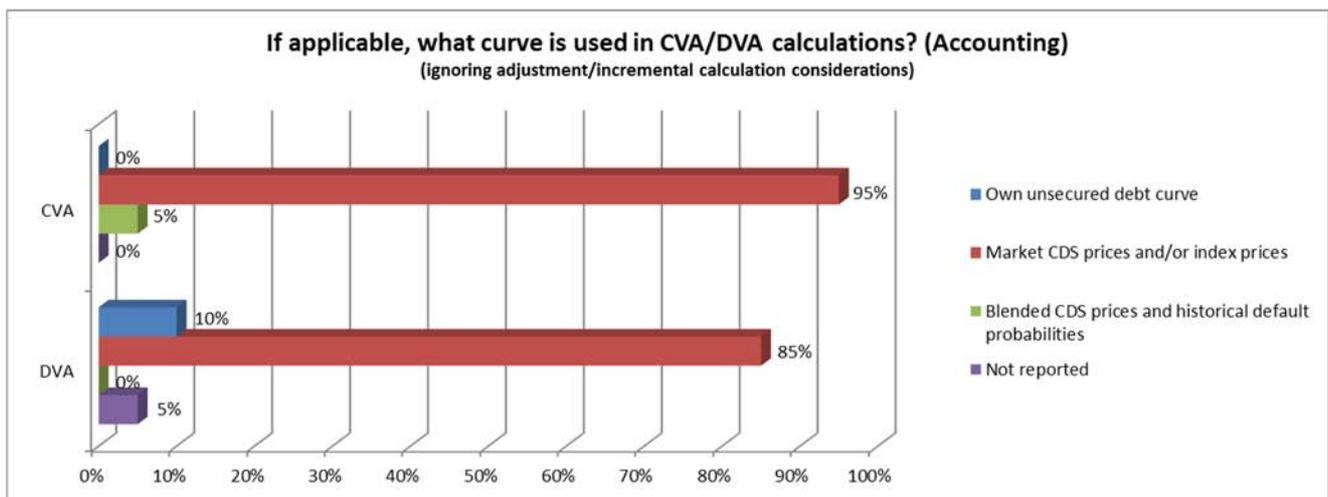
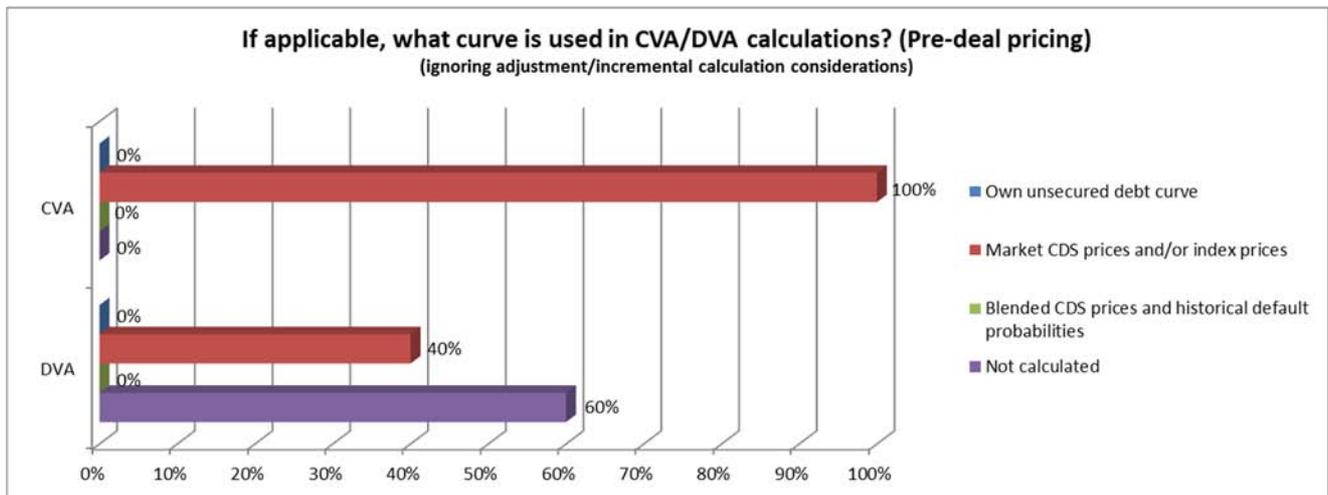
Pre-deal pricing and accounting practices

CVA

For many years, large international banks have used market implied inputs for default probabilities to compute CVA, in line with US accounting standards with respect to fair value measurements. The introduction of IFRS 13 (as well as regulatory requests such as the ECB Comprehensive Assessment) and its determination of fair value by reference to a so-called “exit price” has triggered a larger move towards such a calculation of CVA¹.

This shift towards market implied parameters is confirmed by the results of the survey, where the market practice with respect to the CVA aspect of derivative pricing adjustment has for the most part reached a consensus. As shown below, banks by and large use market CDS and/or index prices to compute CVA, both for pricing and reporting purposes.

Beyond the sample of the present survey, it must be noted that the pressure – both from regulators and auditors – to move to a computation of CVA based on market implied probabilities of default is rising for smaller financial institutions. In light of this, it is expected that the adoption of market-implied practice should be more widespread in the near future. This in turn drives a series of operational questions, as to how to best imply such parameters (especially for those banks exposed to a significant number of illiquid counterparties). Further, this interpretation of CVA comes at the price of higher P&L volatility, which banks will need to learn to manage and mitigate. This is a particularly important issue for smaller size institutions that may not want to (or need to) hedge CVA as credit risk may be a core risk that they are already comfortable to warehouse.



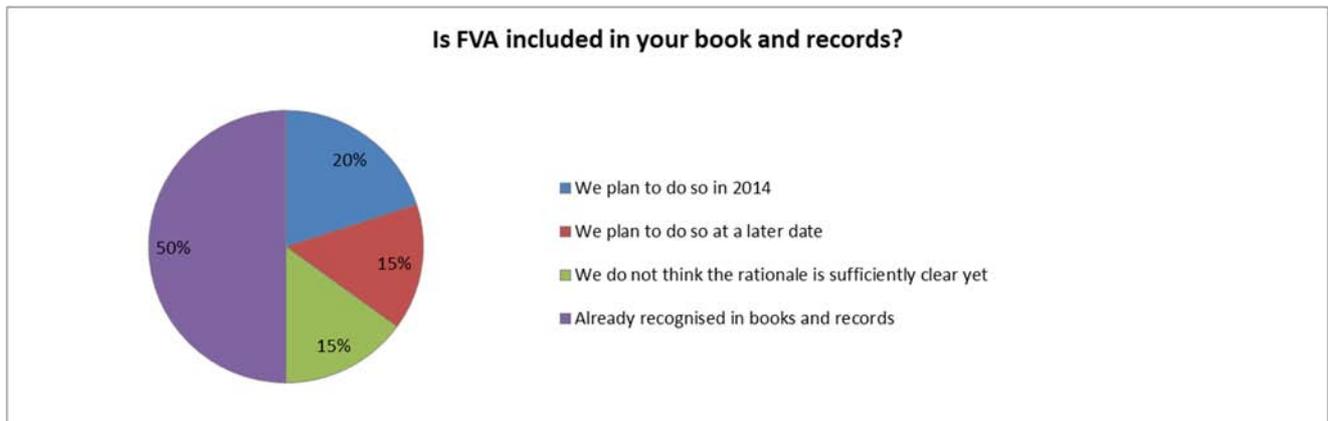
¹ With respect to maturity considerations, most participants calculate xVA to the earlier of either maturity or mandatory break, although three respondents have stated that they also take optional breaks into account. One participant has adopted a mixed approach and includes optional breaks for the purpose of reporting.

DVA

With respect to DVA, reporting practice is almost consensus as well, with 90% of respondents using market CDS to calculate their accounting DVA. On the pricing end however, the DVA picture is less clear, with only 40% of respondents using market prices to compute DVA as a pre-deal pricing component, whereas the twelve other participants do not give the benefit of DVA in their pricing, in part because of their recognition of a funding benefit related to expected negative exposures (see xVA Overlap). As far as pricing is concerned, the end result is therefore relatively similar, with the only difference mostly arising from whether the pricing benefit is attributed to DVA or FBA.

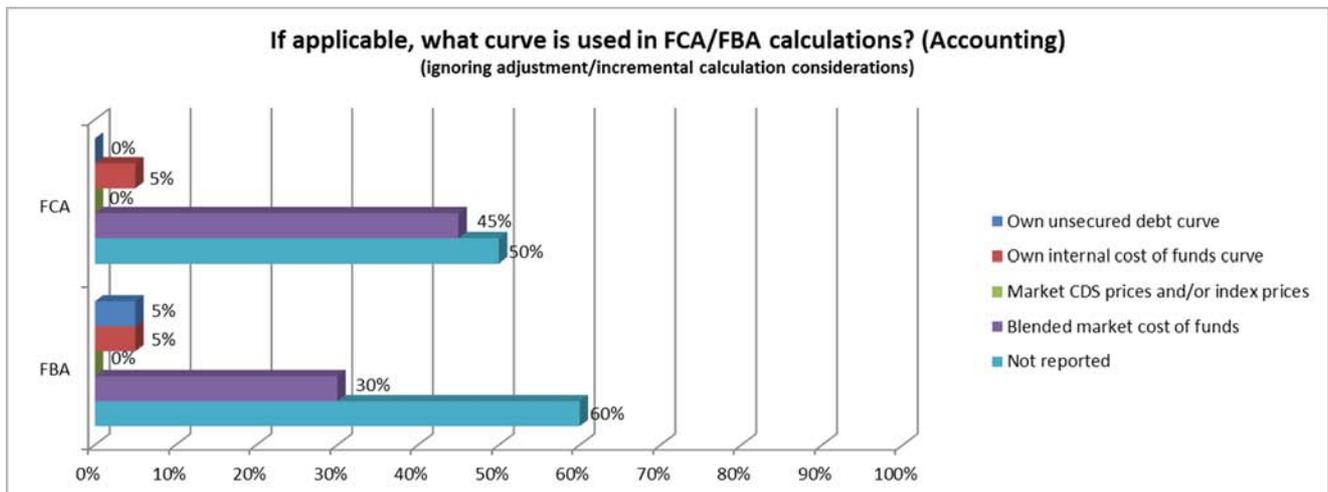
FVA

As at the end of 2013, eight banks were reporting FVA in their books and records. Our survey highlights continued adoption of funding adjustment as a fully incorporated component of derivatives pricing, with now 10 banks reporting FVA – or exactly half of the survey sample. Among those not reporting, a handful of respondents have signaled their intention to adopt FVA in the near future, as shown in the chart below).



While FVA adoption is slowly gaining ground, the calculation methodology and reference benchmarks are still far from settled. Firstly, we note that among the participants who do report FVA, some only report one side of it explicitly (the FCA component), although as noted above, a funding benefit is already recognised in part through DVA reporting.

The majority of respondents which do report FVA at present uses some form of a “blended market cost of funds” to calculate FVA in their accounts. The remainder of participants make reference to their own funding costs, either by way of their own unsecured debt curve or, by using an internal measure of the bank’s cost of funds.

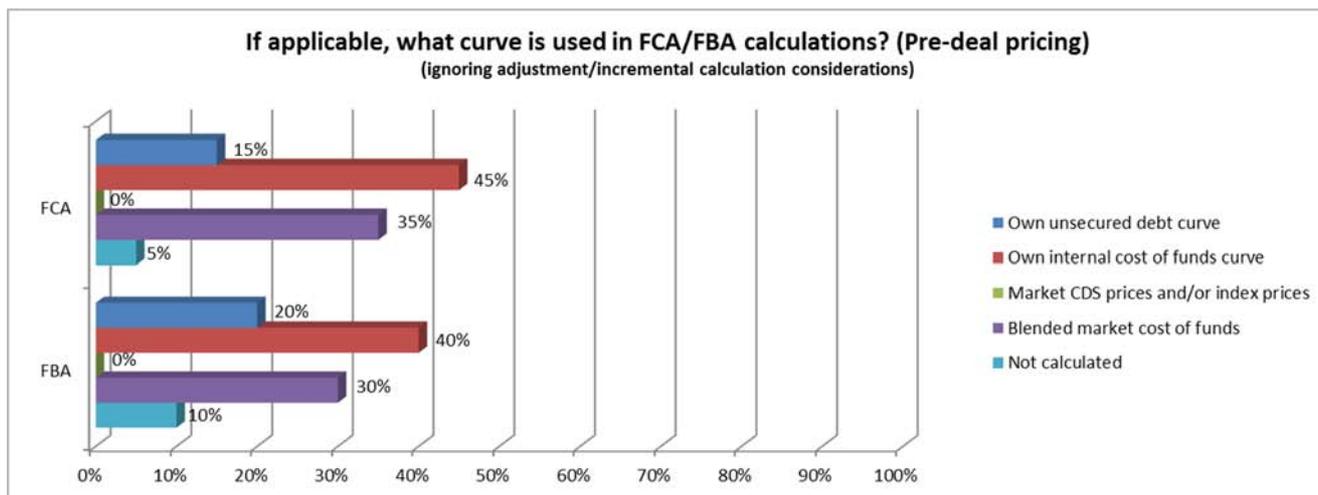


With respect to pre-deal pricing, a much larger proportion of respondents do take into account some form of funding valuation adjustment. Only one participant stated that “it did not believe in FVA” and as such does not incorporate at all in its derivatives pricing methodology.

Interestingly, a couple of respondents who do report FVA based upon a “blended market cost of funds” calculate (larger) FVA based upon their own internal cost of funds for pre-deal pricing.

Overall, while the FVA methodology picture remains fairly mixed, some trends are starting to emerge, with continued adoption of FVA reporting across a wider range of banks, which has resulted in a number of high profile one-off announcements by large institutions.

While the majority adoption of blended market cost of funds in reporting is notable, pre-deal pricing methodologies on the other hand, remain a big question mark, reflecting the still large discrepancies in interpretation of funding as a derivatives trading component.



We note that as per the previous question, a very large majority of respondents incorporate FVA in pre-deal pricing, although in 25% of cases this is only selectively applied, either because the measure is calculated but passed through to the client on a discretionary basis, or because it is applied in an asymmetric fashion (i.e. the FCA is charged to the client, but no FBA benefit is recognised).



xVA Overlap

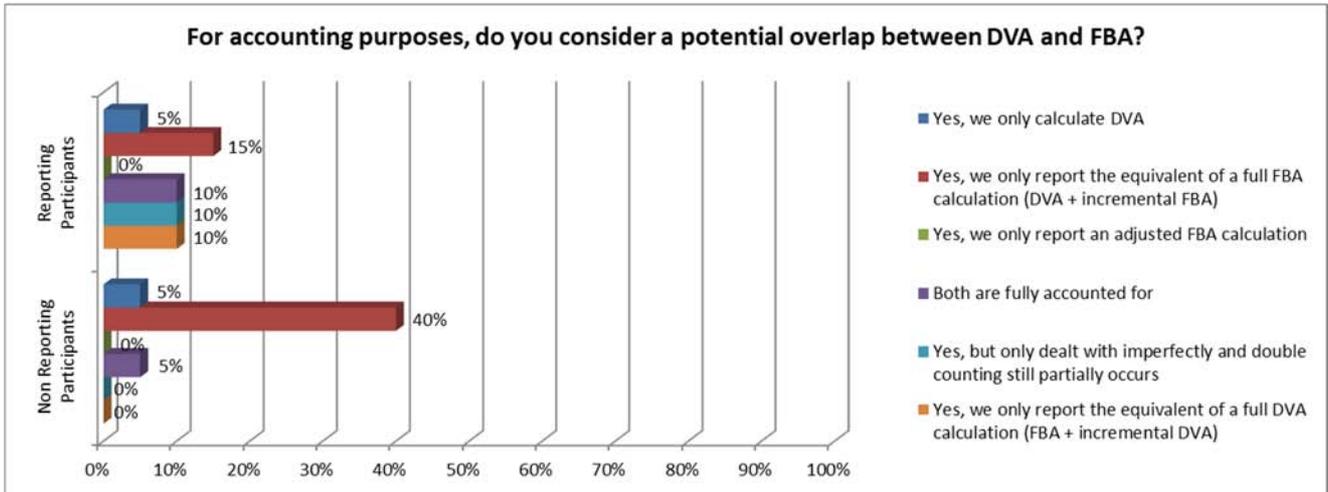
DVA vs. FBA

The matter of how the various components of derivative pricing adjustment may interact and sometimes overlap with each other is a crucial and ongoing area of debate among counterparty credit risk practitioners.

This is most acutely felt on the FBA/DVA side of the equation as the consideration that both components are ultimately recognition of the institution's own creditworthiness and as such fully accounting for both may result in overestimation of the funding benefits to the bank.

In the chart below, we separate the respondents between those who do presently report FVA in their books and records and those who do not. The current practice within those banks which do report FVA is mixed, but double counting is generally acknowledged, and given the broad economic equivalence between the two concepts, banks tend to recognise the equivalent of a full FBA only – or whichever one of DVA and FBA is the largest, depending on calculation parameters. Equally, for those which do not yet report FVA, the large majority emerged in favour of the equivalent of a full FBA recognition only.

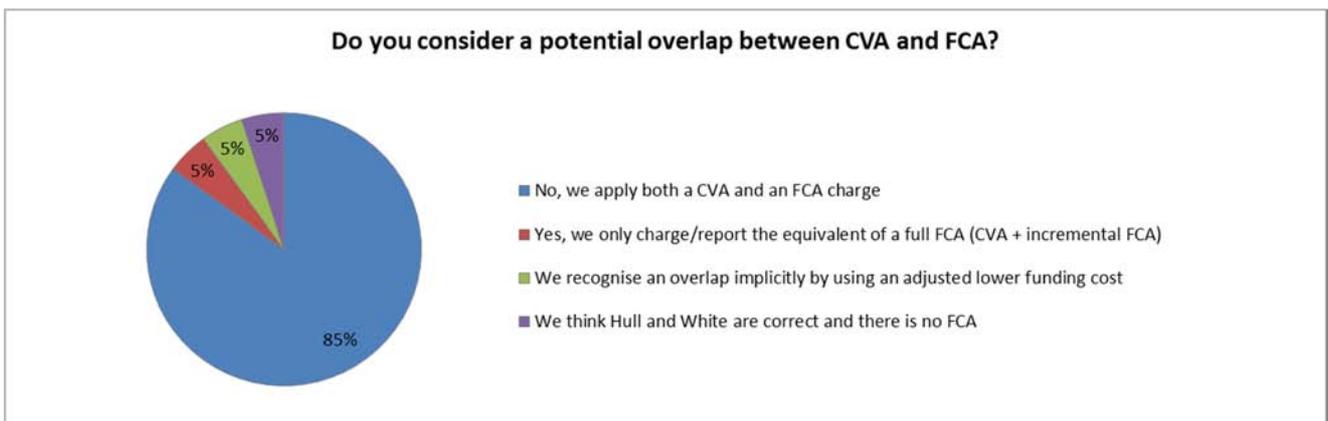
Some respondents still double count DVA and FBA in their reporting to a certain extent but apply some haircut/scaling factors to the pricing curve in order to mitigate such double counting.



CVA vs. FCA

Despite some market discussions to the contrary, a very large majority of respondents does not consider that CVA and FCA are overlapping concepts. However, the general market practice of haircutting the unsecured funding curve or using a scaling factor could be seen as an implicit acknowledgment that there is some form of double counting involved.

Among those respondents who do believe there is some degree of overlap, one participant (which notably does not report FCA in its books and records) only charges CVA, plus incremental FCA on top. Another respondent signified that there is a systemic component of market spreads which should not be included in the FCA calculation and as a result some overlap between CVA and FCA is ignored. Lastly, one respondent does not believe in FVA.



3. FVA Management

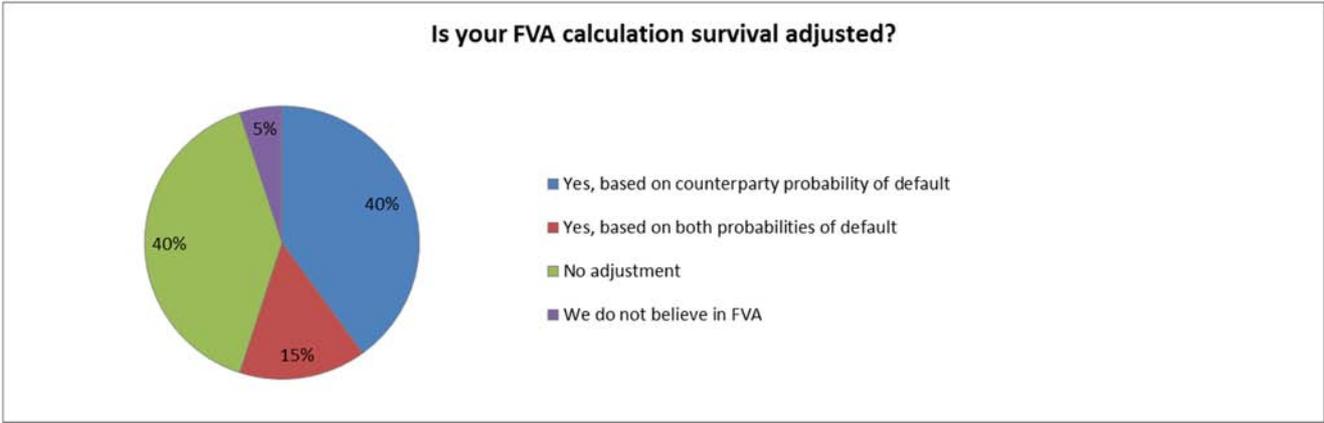
FVA Calculation and Discount Curves

Survival adjustment

The inclusion of default probabilities in the FVA calculation is another topic where market practice widely varies. The dominating decision as to whether one should use some form of risky discounting – to take into account the possibility that one of the two counterparties may default before the term of the transaction – is roughly split between institutions that make no such adjustments and banks that do adjust for the probability of default of the counterparty, with a handful of respondents stating that they adjust for both the counterparty’s and their own probability of default.

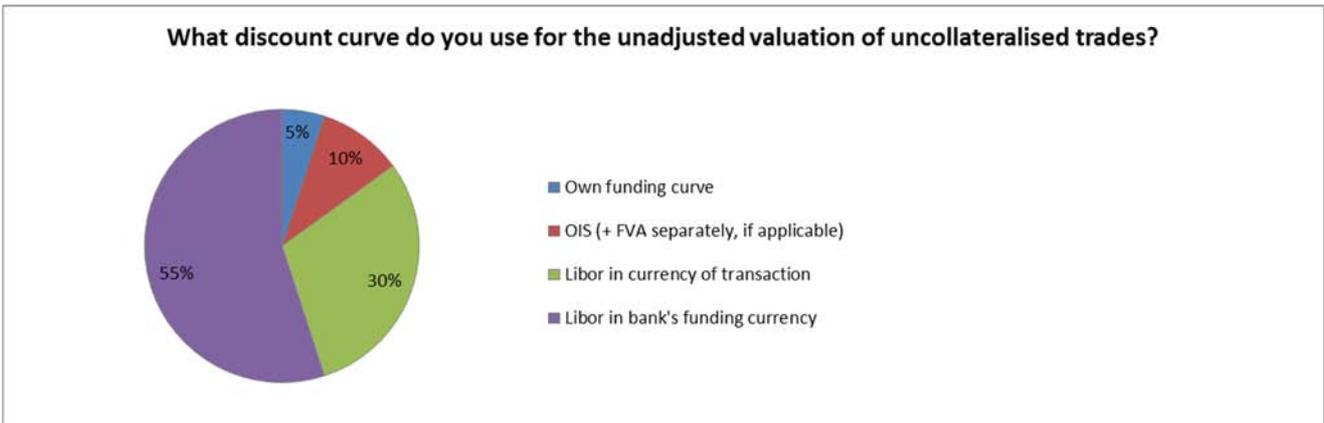
One such respondent has indicated that not taking into account one’s own probability of default would result in too conservative an FCA calculation. On the other hand, another respondent has expressed the view that FVA is by definition part of the termination value (i.e. the so-called replacement cost), and therefore no additional adjustment should be applied.

Notably, among those participants who are currently not including any adjustment for survival, two are considering doing so in the future, based on the inclusion of counterparty probability of default. One further respondent has clarified that while no survival adjustment takes place on a systematic basis, the bank does incorporate it on a discretionary basis for significant trades.



Discounting of uncollateralised trades

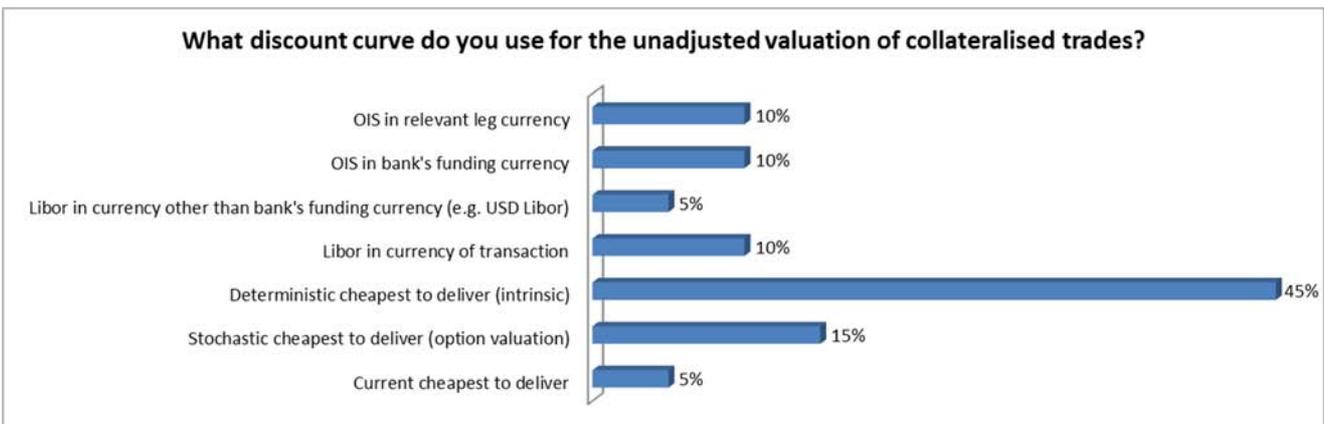
The risk-free benchmark preference of the surveyed banks for the uncollateralised part of their business remains predominantly LIBOR, with 55% of respondents stating that the discounting of such trades is being done with the bank’s funding currency as the base rate (although one of those respondents stated that it is planning to move to OIS discounting in the near future) and a further 30% using the currency of the transaction.



Discounting of collateralised trades

Within the collateralised universe, the move towards universal OIS valuation triggered in the aftermath of the credit crisis is mostly settled. All three respondents who have stated that their discounting practices are still based on Libor curves also have clarified that they calculate a separate overlay to take into account the OIS-Libor basis.

Market participants have now moved on to the next level of modelling complexity to include a more accurate representation of all optionality features with respect to collateral delivery.



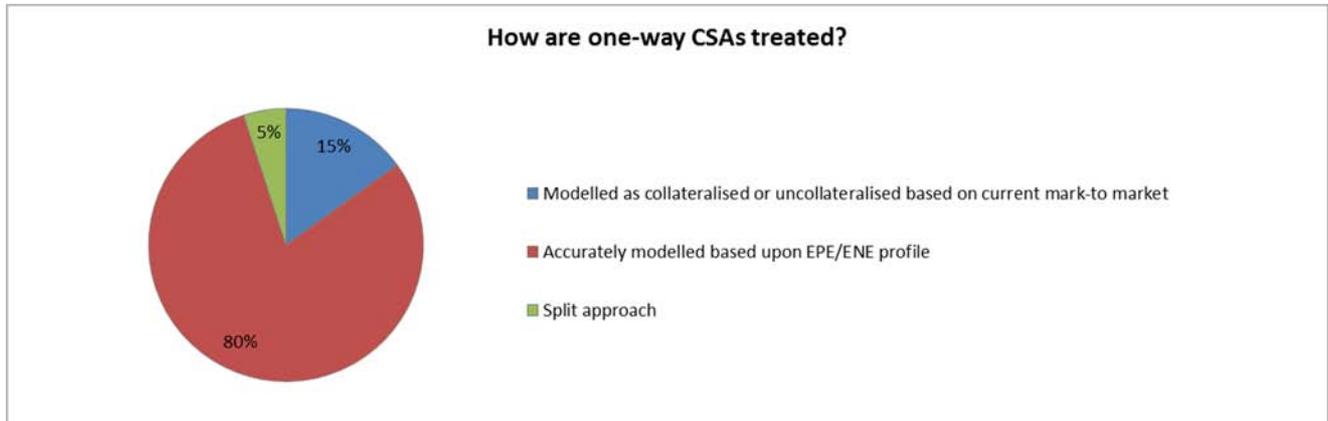
Most survey participants incorporate CTD with various levels of sophistication, with a majority stating that in their current implementation, CTD determination is done on a deterministic (i.e. intrinsic) basis. It is probable that in the future, more banks will continue to work towards the adoption of the more comprehensive option-based framework. Likewise, banks that do not yet incorporate

any measure of CTD at all are likely to move towards that goal in the future.

A further question raised by some participants, which is likely to become a growing issue as the level of granularity with respect to collateral agreements increases, is how to best manage issues brought by non-cash collateral and cash collateral in currencies that have limited observable OIS term prices.

One-way CSAs

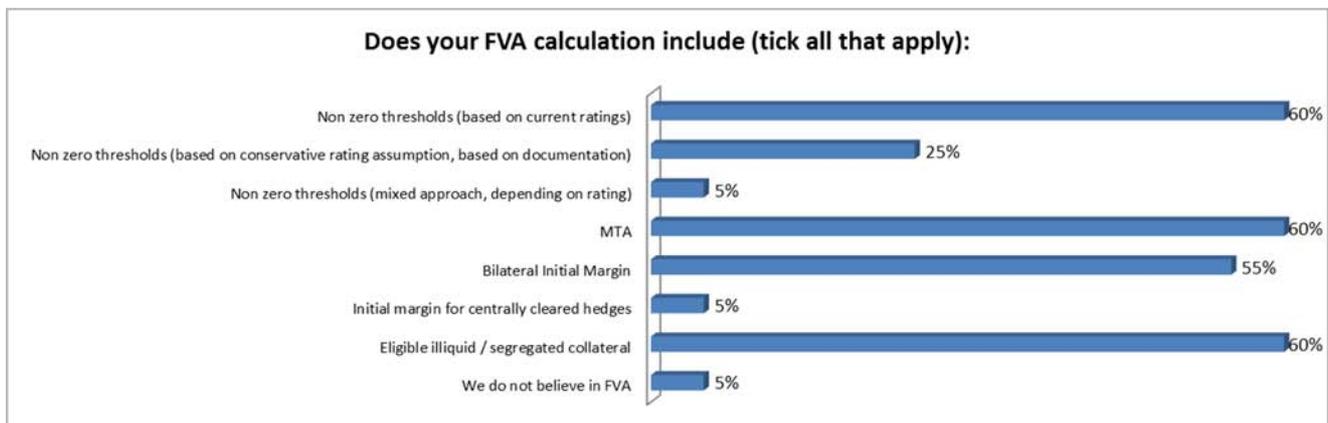
A very large majority of the respondents expressed the consensus view that they accurately model one-way CSAs based upon the given exposure profile rather than the minority view, under which the bank opts for the binary treatment of considering the counterparty as collateralised or not depending on whether the net position is in-the-money or not.



Core FVA and Contingent Costs

Core FVA

Beyond so-called “Core FVA”, loosely defined as those FVA components that are based on static/deterministic terms of the transaction, market participants increasingly need to make a number of decisions as to how contingent costs should be reflected in the calculation of funding valuation adjustment. This conversation will only intensify as the complexity of how banks account for dynamic collateral characteristics increases, and given the growing regulatory-driven importance of centrally cleared trades and their associated margin and collateral requirements.



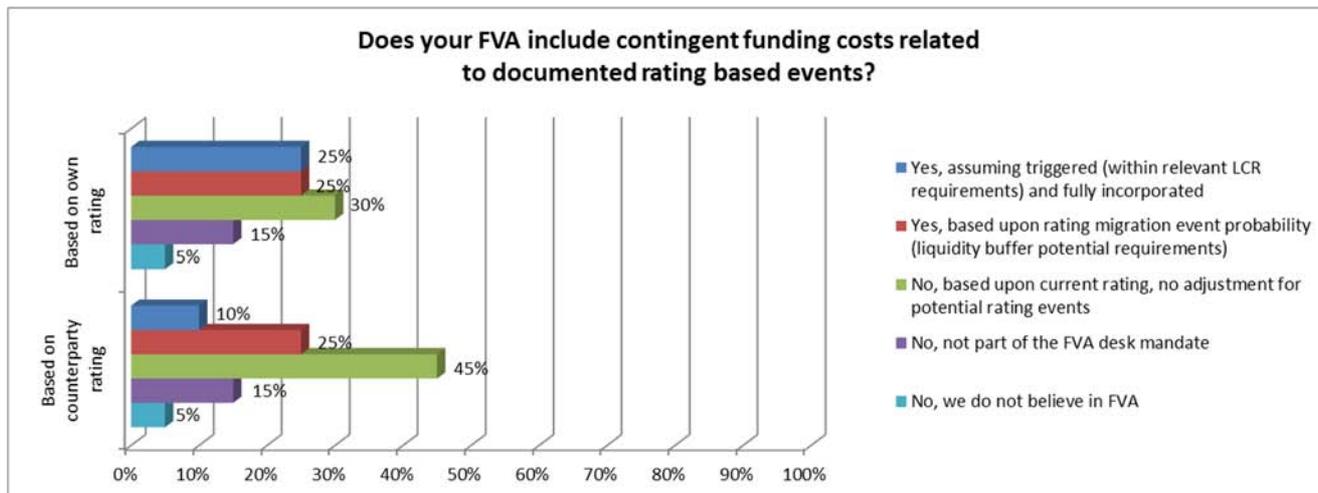
As is shown above, the incorporation of non-zero thresholds, minimum transfer amounts and bilateral initial margin (all components of “Core FVA”) are widely considered as a consensus input for the purpose of FVA calculation. Under the surface however, there remains a wide diversity of practices even for those inputs where most banks agree that they should be an integral part of the FVA, with a varying number of these inputs being used in the context of pre-deal pricing but not for reporting into books and records.

Contingent Costs

Rating-based events are a significant source of contingent funding costs, especially in the context of the regulatory liquidity requirements such as LCR, which mandates that banks incorporate and provision for the cash outflows and collateral requirements potentially triggered by future adverse rating changes.

Respondents use a variety of options on this particular aspect of funding costs, with the largest proportion of banks currently making no adjustment for downward rating migration, and calculate FVA on the basis of current rating status.

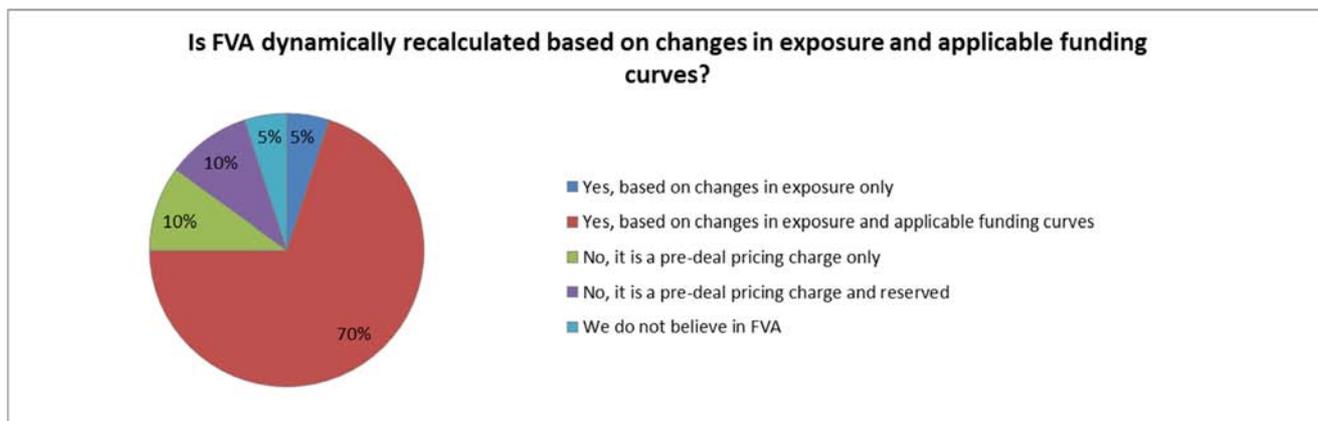
With respect to their own rating, roughly half of the respondents include these contingent costs for pricing purposes, evenly split between those participants who work from a worst case basis, assuming the most punitive of LCR requirements or documented events are triggered, and those participants who attempt to model some form of rating migration path to arrive at a probability of triggering those rating-based events. This detailed modelling incorporates a range of solutions, from a relatively basic use of historical rating transition matrices to more advanced migration models.



Mark-to-Market

As both the exposure profile and funding curves (regardless of what benchmark is used) change throughout the life of the trade, banks need to remark their FVA calculation to market. The behaviour with respect to this marking-to-market process is largely dominated by institutions that do so fully, on the basis of both exposure profile changes and funding curve moves (including five respondents who do not currently report FVA but have stated their intent to proceed on a full mark-to-market basis when they start reporting in 2014 and/or Q1 2015).

The remainder of the field is evenly split on this question, with some respondents treating FVA as a pre-deal charge (although not reserved), and other respondents taking a pre-deal charge that is reserved.



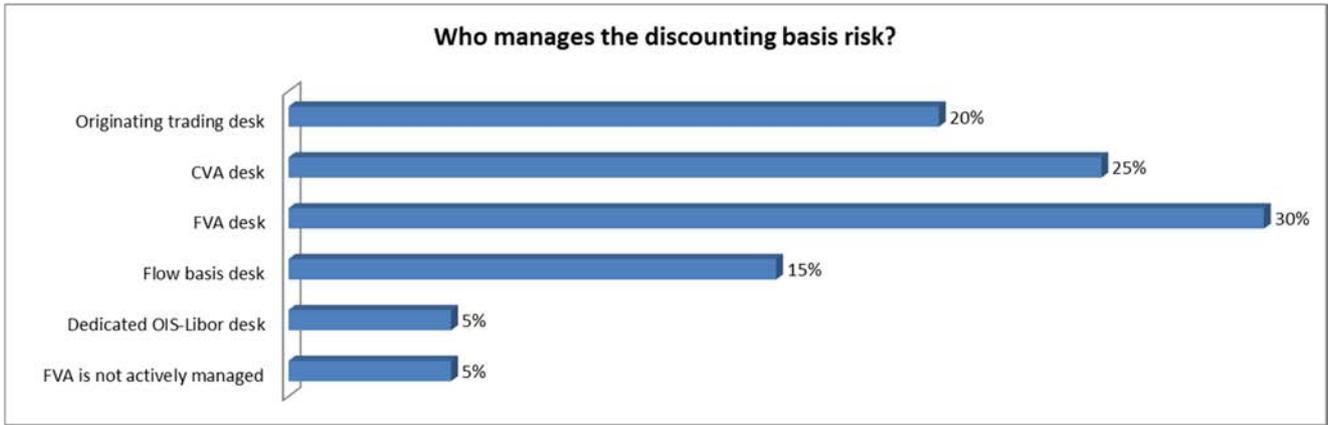
Desk Mandates and Organisational Set-Up

Basis Risk Management

The growth in both size and scope of basis risk management responsibilities is increasingly being resolved through the introduction of centralised risk management, either run by the CVA desk, the FVA desk or a dedicated flow basis desk.

The set-up where the FVA desk owns basis risk dominated the responses collected, especially when taking into account that one participant using the CVA desk to manage basis risk notes that its CVA and FVA desks are one and the same. Likewise, one of the “Flow basis desk” respondents has that desk part of a set-up where flow basis, CVA and FVA desks are sitting under the same roof. Furthermore, another “Flow basis desk” respondent stated its intent to move risk management to the FVA desk.

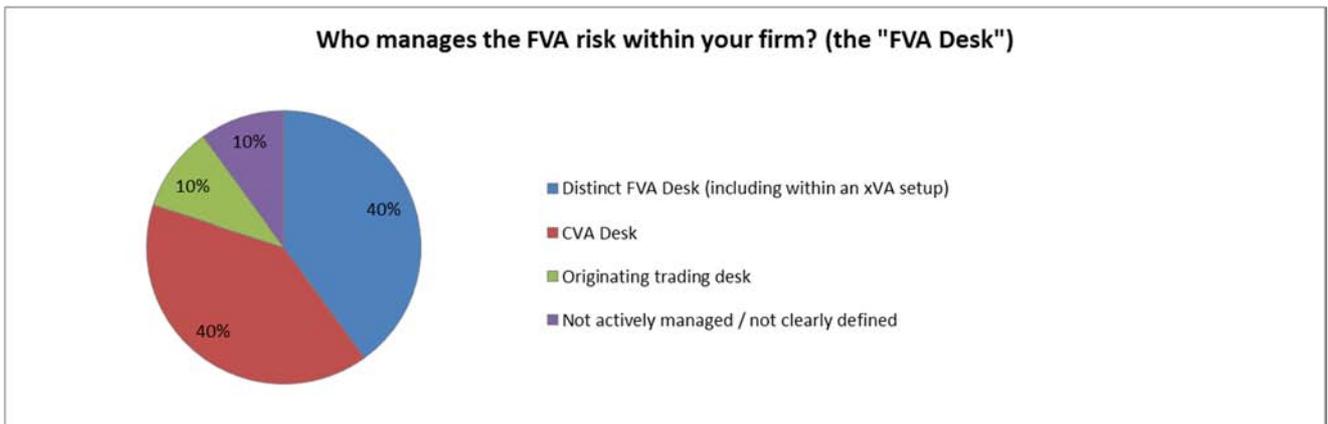
Among the participants who have responded that basis risk management remained with the originating trading desk, one added that the CVA desk is relied upon for complex CSAs (thresholds, one-way CSAs, etc.) while the other indicated that it also relied on the CVA desk for portfolio effects (e.g. uncollateralised trades, thresholds, triggers and one-way CSAs).



FVA Risk Management

With respect to the management of FVA risk itself, the current market approach appears to be split between a coordinated approach where the CVA trading desk adds FVA to its other duties and a standalone approach, with a dedicated FVA desk set-up. Within that latter category are also included institutions where risk management is the remit of a comprehensive xVA desk, which includes but is not strictly defined by its initial CVA mandate.

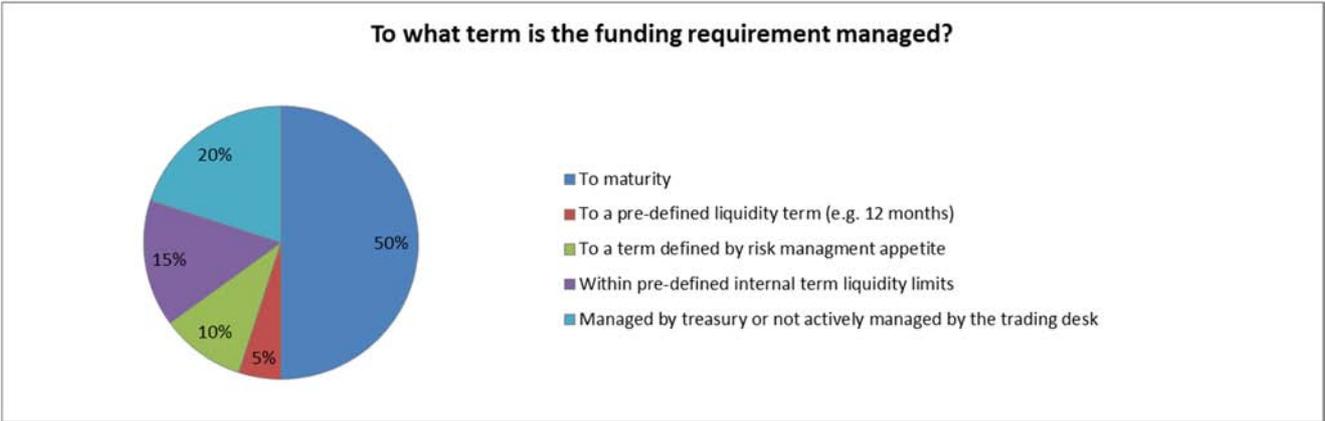
The exact scope of the FVA desk mandate, and whether it includes considerations beyond the risk management of FVA (to incorporate matters such as liquidity and collateral management, ratings-based events and contingent funding, or central clearing related issues), is a topic that is dealt with in Section 4, where “FVA desk” remains defined consistently with the response given here with respect to what desk actually manages derivatives funding risk.



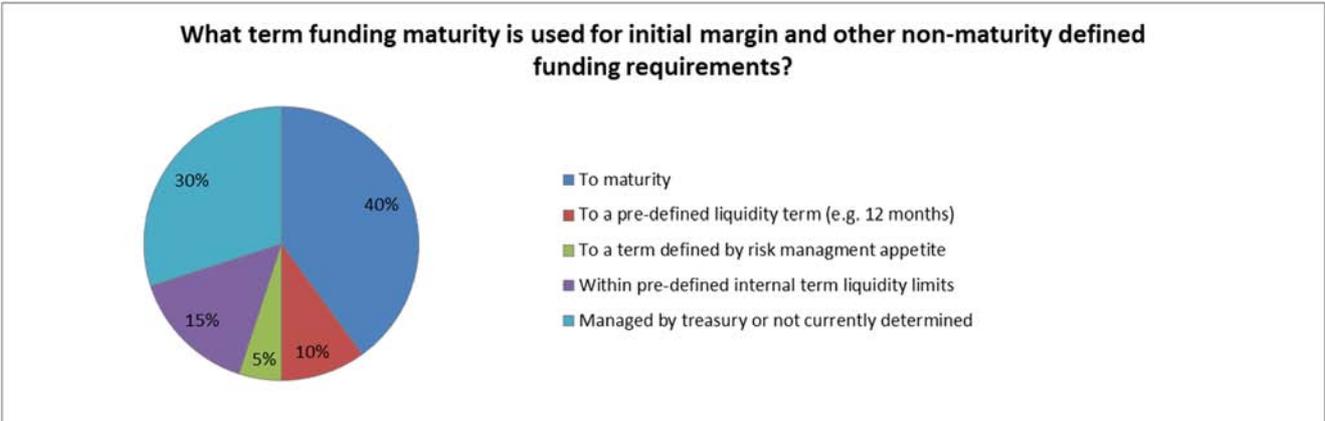
Term Funding Requirements

The management of term funding requirements is a responsibility that is increasingly part of the front office mandate, although we note that for 20% of respondents, this is a process that is still in the remit of the treasury function (5%) and/or is not actively managed by the trading desk (15%).

For those institutions where funding requirement management resides in the front office, a large majority of the respondents have stated that the funding requirement is managed to maturity, with the rest of the field opting for a variety of choices, including managing within pre-defined internal term liquidity preferences, to a pre-defined liquidity horizon term, or more rarely, to a term defined by risk management appetite.



In the context of funding requirements that are not related to maturity, the same pattern emerges: either these considerations are the responsibility of the Treasury function (one respondent), are not actively managed or taken into consideration at all (five participants), or when managed, they are managed to maturity.



4. Collateral Considerations

Collateral Management and CTD Determination

The management of collateral, and in particular the optimal use of collateral in the context of optionality and determination of cheapest-to-deliver, is now an issue intimately related with the issue of the derivative valuation adjustments.

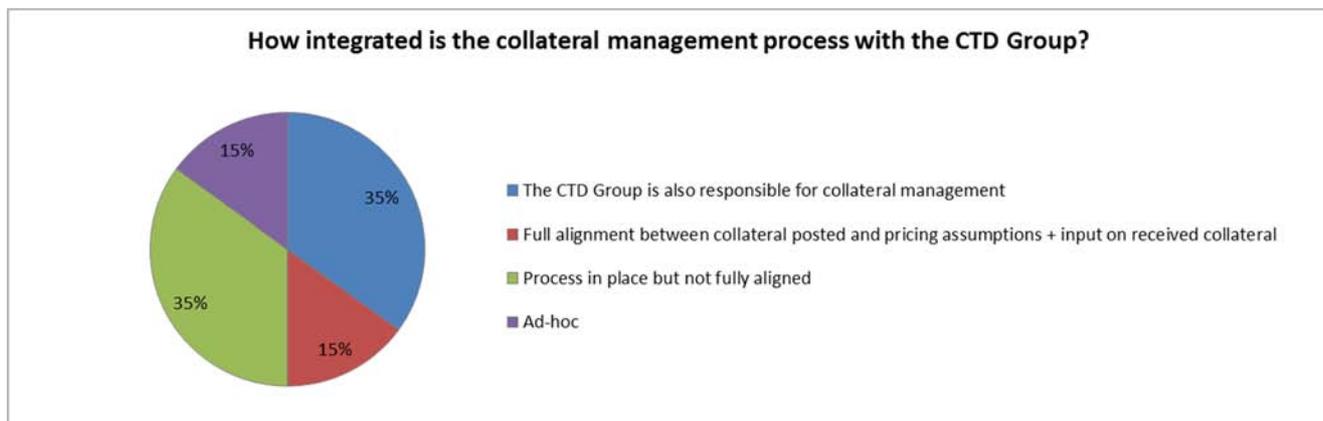
Industry practice as to who is in charge of determining CTD collateral is evenly split between handing these responsibilities to the FVA desk (where "FVA desk" remains defined consistently with the response given by respondents above), to the collateral management group, or to a dedicated collateral optimisation team.

In all cases, it is notable that these responses were consistent across both cash and securities collateral.



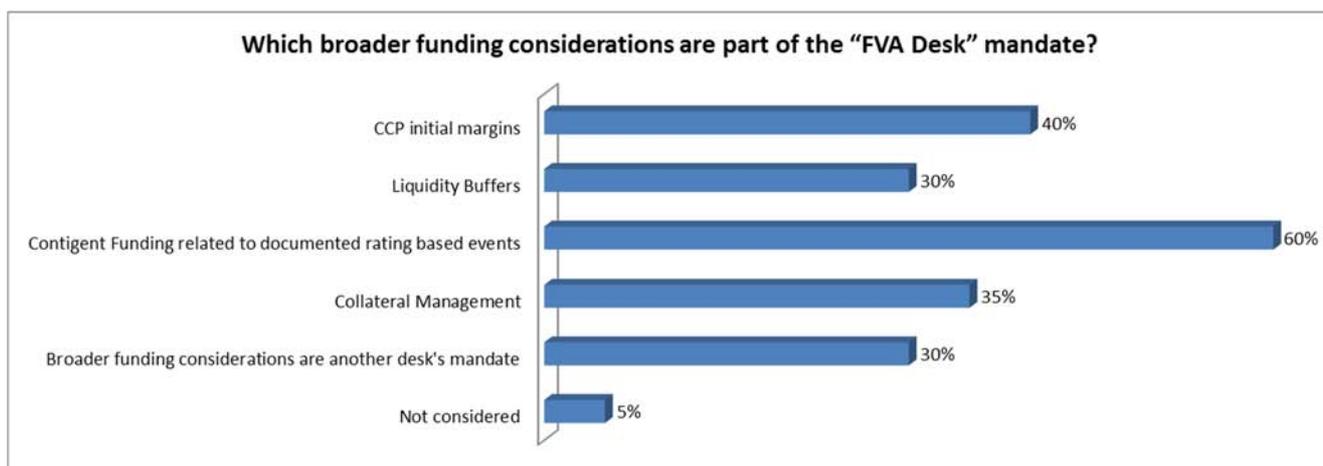
The integration of the CTD group (defined above as the desk in charge of CTD collateral determination) within the larger context of collateral management is another area where a variety of market practices can be observed, as shown below. The bulk of market practice is evenly split between institutions where the CTD Group is also in charge of collateral management and institutions where an integration process is partly in place, but collateral management and CTD determination remain not fully aligned.

The more comprehensive solution of fully aligning collateral posted and pricing assumptions remains the minority choice at present, but a couple of institutions (one classified as not fully aligned, another as ad-hoc) have stated their intent to evolve towards a full alignment between collateral posting process and pricing assumptions.



FVA Desk Mandate

The scope of the FVA desk responsibilities can extend considerably beyond the mere calculation and management of core FVA. As pointed out above, this now routinely includes the management of contingent funding. As the chart below shows, initial margin, liquidity requirement and collateral management feature as an FVA responsibility for approximately a third of respondents.



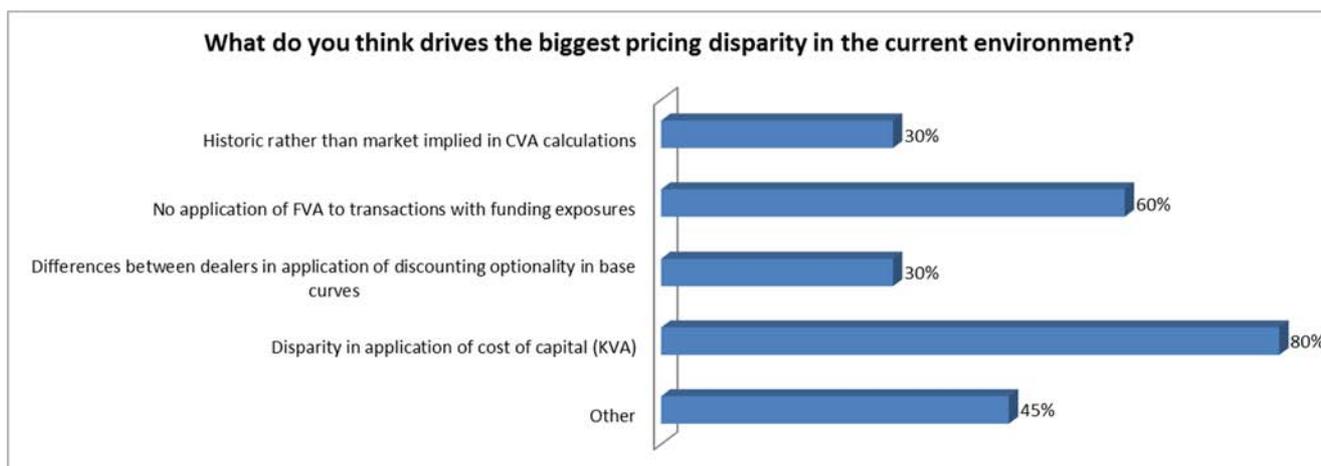
5. Conclusion: xVA, an ever-moving target?

Throughout this FVA survey, numerous issues have surfaced which could explain the pricing disparities that market participants observe with respect to derivatives pricing. As described below, respondents point out what in their opinion are the components most responsible for those pricing disparities.

Discrepancies across valuation adjustments with respect to capital costs (known as KVA), i.e. the disparities between how capital cost is calculated, attributed and passed on to the clients, is the major factor cited by survey participants. The uncertainty around market practice relating to the application of FVA to transactions with a funding component is an important second factor, cited by 60% of participants.

Other recurring themes include CVA pricing methodologies/implementation, degree of overlap, funding curves input or the use of recovery models.

Six participants have highlighted the use of historical PDs as a driver in pricing disparity. Notably, only one of the more sophisticated banks represented in this survey still uses a blend of historical and market implied PDs. As noted above in the CVA pricing section, the move towards market implied is more a question of when rather than if at this stage, as regulatory and accounting policies will continue to pressure even smaller institutions to move towards market-based exit pricing CVA methodologies.



When prompted with the question as to how they allocate valuation adjustments across the various xVA constituents in their own pre-deal pricing, half of the participants found it difficult to provide a meaningful answer. Reasons invoked generally revolved around the ad hoc nature of such adjustments for many institutions, as the type of trade, the nature of the counterparty and other trade specific factors are all factors in allocating xVA.

From the answers received however, one major conclusion emerged: in line with the previous question regarding pricing disparities observed in the market, KVA is at the same time the largest xVA component for some institutions or not incorporated at all at other institutions.

These results highlight that despite CVA and DVA calculation uncertainty increasingly being in the rearview mirror, other considerations related not only to funding but also to other, potentially larger valuation adjustments (such as KVA) will likely ensure that xVA remains a source of continued challenges for banks, from an operational, accounting, regulatory and risk management perspective.

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