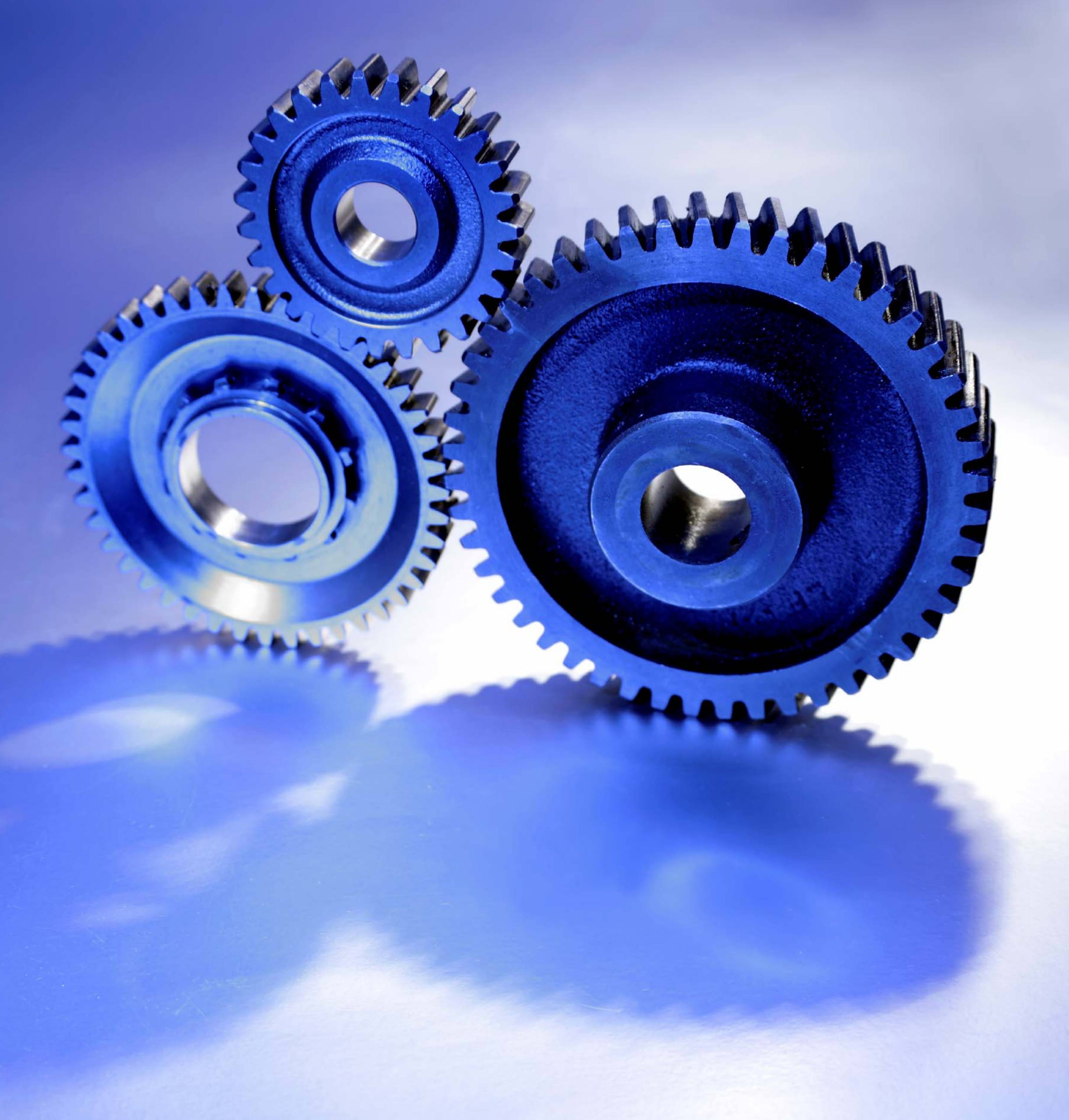

CVA Survey

July 2010

SOLUM FINANCIAL

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Survey Methodology and Participants

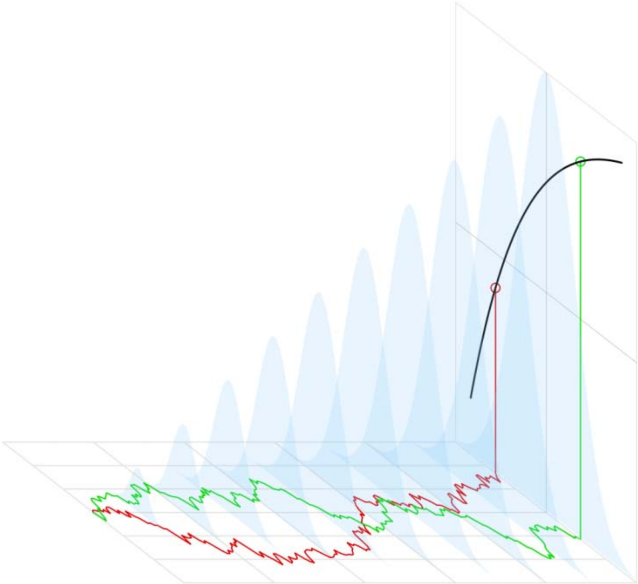
Responses are point-in-time snapshots of the participant's approach and as such, approaches may have changed since the time of interview.

The survey report is based solely upon the responses received. Not all participants have provided the same level of detail and some answers have been limited by the extent of the participant's operation.

For some institutions with several CVA operations a combined response has been submitted apart from one participant for whom two interviews were conducted independently. As such the report is based upon 16 responses submitted by 15 participants.

7 out of the 10 largest banks in the world are represented in the survey. [1]

[1] *By assets 2009. Source: The Banker Magazine, 6th July 2010*



CVA Survey

1. Introduction

Spurred by one of the deepest global credit crises of recent times, a profound evolutionary process is underway. Banks that have historically viewed their exposure to counterparty default as relatively minor and best managed by reserves or exposure limits are now moving to actively marking and hedging these risks. The scale of this undertaking represents one of the largest infrastructural projects of the last few decades. The simple objective of attaching a value to counterparty defaults can commit a large bank to a quarter of a trillion trade valuations and to gain enough understanding to carry out a hedge can involve twenty times more effort again. Yet despite these formidable challenges, few banks feel they can afford to be passive bystanders in this development, not least because there are considerable pressures towards change:

The risk is real. Even in normal market conditions, uncollateralised or weakly collateralised derivatives transactions with lesser-rated counterparties will trigger losses upon counterparty default. In challenging market conditions, even strongly collateralised exposures, as in the case of Lehman Brothers, can cause serious trouble.

The principle of marking credit risk to market is well established. Corporate bonds are marked at a higher yield to reflect their riskiness and the growth of a liquid market in credit default swaps has allowed marking-to-market of default risk on arbitrary cash flows. This has had obvious implications for counterparty risk management.

Regulators. Counterparty credit risk has both pro-cyclical and systemic features, which render it of particular interest to regulators. Banks' widespread interest to increase the transparency of this risk and their search for better ways to mitigate both its idiosyncratic and systemic features have not gone unnoticed – regulators are likely to impose pressure towards uniformity of approach.

The need for an in-depth survey is clear – the market is in a state of flux. Some banks are halfway through a process of change; others have coherent reasons for following a different path. Overall there is a mix of agreement and disagreement over even basic business models and approaches. Two strong themes emerged from the interviews:

Real / risk-neutral

The single largest theme and corresponding mix of agreement and disagreement lies in the fundamental approach to counterparty defaults.

There is universal agreement on what quantity is to be measured – a credit valuation adjustment (CVA) derived from coupling the expected positive exposure (EPE) over time with a model for the default of a counterparty. There is also a universal agreement as to what this quantity stands for; CVA represents an *expected loss*, the centre (roughly) of the portfolio loss distribution, not the tail. The Basel II calculations also co-opt EPE, but with the view to produce a capital reserve proof against all but the worst portfolio losses.

There is however less agreement on whether the modelling of counterparty defaults should be based on history (real) or on the current market (risk-neutral). This real / risk-neutral split is not just superficial but cuts to the core of the use of CVA. Banks seem to demand two potentially conflicting things from CVA. It should adjust derivatives valuations to allow for counterparty effects, providing a **fair value**, and it should also provide the basis for a strategy to **self-insure** against losses that arise from counterparty risk. This balance between remaining competitive and remaining solvent is impacted by the real / risk-neutral choice in different ways.

Both approaches can claim to meet both objectives: the real approach through diversification and the risk-neutral approach through hedging. With sufficient de-correlation, the risk of the whole can be considerably smaller than the sum of the risks of the parts. Profits, however, remain additive. A business which calculates CVA on a real basis could therefore remain both competitive and solvent. Conversely, if a liquid CDS market exists, hedging strategies can produce efficient risk offsets, justifying a fair value price via arbitrage and a cover against losses.

None of these approaches are flawless however. De-correlation seldom survives crises, and neither does the liquidity required for hedging. Decoding fair value from the faint market signals is probably too imprecise to peg real / risk-neutral from that alone.

Self-insurance presents starker choices. During prolonged periods of good weather, market spreads are low and thus risk-neutral CVA is low. Hedging SPV01s (sensitivities to credit spreads), even with macro hedges such as indices, becomes the mechanism that provides protection against the mark-to-market ballooning of CVA in a crisis. Given the difficulty of providing idiosyncratic hedging of SPV01s or indeed JTD (exposure upon instantaneous default), this hedge is imperfect but in a 'gentle' crisis where actual defaults stay lower than the implied default rate, this can be managed. So far, the present crisis has been 'gentle'.

With the real approach, if the pressures of competition can be sufficiently resisted to consistently mark to a 'through-the-cycle' probability, there will be relatively little P&L volatility and exposure to actual defaults will be manageable much in the same way. The use of an expected loss rather than peak loss offers however only the slenderest of margins, if any at all. In reality it is unlikely that the pressures of the market can be resisted enough to allow an unchanging 'real' mark through both good and bad times. If the mark is lower in good times, the real approach ends up with the same volatility issues as the risk-neutral approach (albeit likely dampened), but without a hedging mechanism to allow the too-small CVA pool to grow to a useful size. It should not be too surprising then that even though the lack of liquidity remains a central concern, as will come out later in this survey, the market tends to favour a risk-neutral approach.

To DVA or not to DVA?

On top of this first structural difference comes another more divisive issue – DVA.

Debt valuation adjustment (the mirror image of credit valuation adjustment) is based around the expected negative exposure (ENE) and de facto provides a rebate based on the likelihood of default of the bank itself. Despite accounting standards mandating the mark-to-market of their own issuance, banks are more sceptical about DVA being a real component of P&L for a derivatives platform. On the face of it, this is counter-intuitive.

Your DVA is someone else's CVA. However unnatural the concept of DVA may seem, it is nonetheless the reflection of your counterparty's CVA that they have by dint of facing you. And that CVA is real to them. If DVA is omitted, the value of trades between counterparties cannot be agreed – each would have to charge the other with no corresponding rebate. Portfolio values summed across the market become non-zero and losses are created out of nowhere.

On top of this, DVA is an obvious mitigant to naked CVA – allowing competitive pricing, and offsetting the necessary asset hedges in a risk-neutral framework.

Although DVA is notoriously 'unhedgeable' – no individual SPV01 or JTD hedge is possible – it is not as if much of CVA is 'hedgeable' in that sense anyway. If for some banks, up to 98% of the counterparties have no available CDS hedges at all, 100% seems less bad for DVA. In reasonable conditions, spreads tend to move together and DVA is not obviously much less susceptible to macro hedging than illiquid CVA. In more distressed market conditions, this becomes debatable. Spread decorrelation increases, as do actual default rates, and proxy hedges potentially introduce additional risk through their exposure to alternative names. Considerable care is required to pick successful hedging strategies.

But the fact remains that DVA is unpopular. Regulators seem in no hurry to push it – quite possibly because if CVA looks like a tax on interconnectedness, DVA can then be viewed as a tax rebate. Participants are reluctant to take it as desk P&L; if they calculate it at all, they often merely monitor it or simply assign it to an independent management line. Unlike the real / risk-neutral debate, it is hard to discern a trend on DVA usage.

2. The Survey

The modern CVA desk has its origins in the early to mid-1990s. Rooted in a basic, passive management approach that was little more than summation of PVs feeding the books and records of a finance function, only a relatively small number of banking institutions were monitoring counterparty risk back then.

The mid-2000's saw the introduction of the "Fair Value" accounting standards. IAS39 and FAS157 required an entity to value qualifying assets and liabilities using all relevant input parameters. The implication being that a fair value measurement should include all pricing parameters, including where observable, counterparty risk. This was probably the formal birth of CVA. FAS157 was more prescriptive over non-performance of credit risk leaving a geographical legacy that maybe pushed North American institutions along the development path slightly earlier.

Business organisation

A wide range of setups can be seen. Staffing, asset and trade coverage are clearly impacted by each institution's history and evolution. CVA desks are in various stages of maturity: some relatively newly formed, some well established and in operation for years. With few exceptions, all participants continue to refine their approach, but some overarching principles hold.

Asset splits are more common than regional. This is driven by historic development, with most approaches emerging from a rates platform and developing further over time to incorporate other asset classes.

As a consequence, all participants include vanilla rates and FX products in CVA. The majority already cover, or plan to cover in the near future, commodities and credit derivatives. Equity derivatives are included by 47% of participants. Exotics coverage is sporadic but shows a similar pattern – the vast majority include rates and FX exotics, whilst just under half include equity exotics and credit exotics such as CDOs.

The approaches range from centralised CVA management of all products, to a segregated approach. Whilst segregation, in theory, could be an issue with regard to netting, in practice counterparty product profiles mean that overlap is limited.

Figure 1

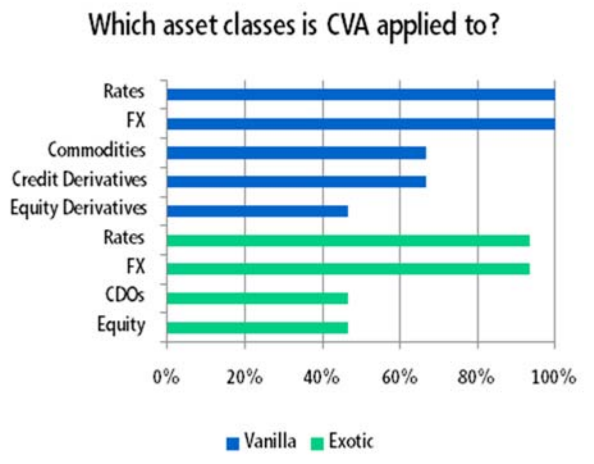


Figure 1 shows percentage of participant coverage by product type. For those excluding exotic products, this may be due to lack of product coverage or lack of CVA pricing ability for exotics.

A global operating remit for a given asset class is the norm with ring-fenced front office resources assigned to the desk encompassing trading, quant, and often some form of IT.

There is a wide range of dedicated headcounts – from a handful up to nearly a hundred – not including access to other shared resources such as general IT, market risk management and the credit control department.

Figure 2

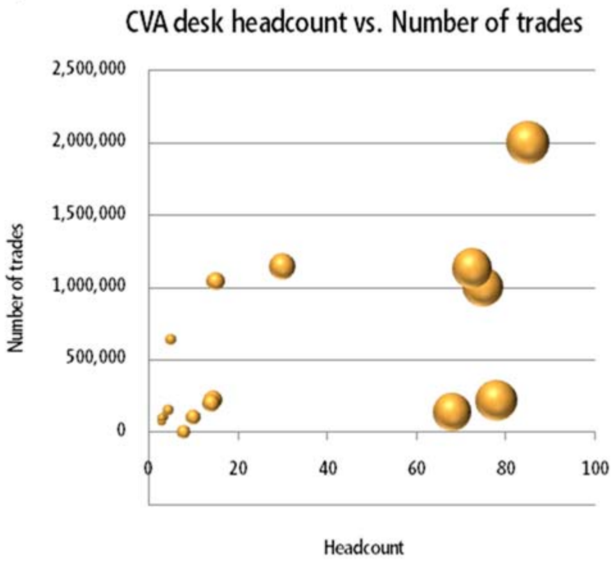
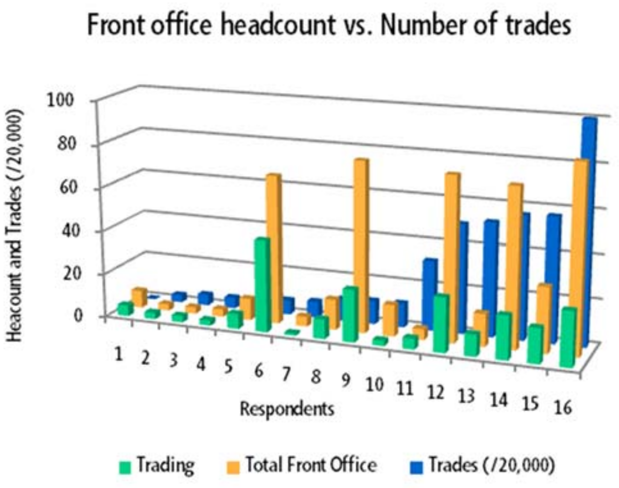


Figure 3



Figures 2 and 3 show the relationship between number of trades and CVA front office headcount. Banks with a longer CVA history tend to have larger staffing, predominantly on the IT and Quant side, irrespective of the total number of trades.

Raw numbers of trades range significantly, with some having upwards of a million, most dealing with hundreds of thousands and a minority with just thousands.

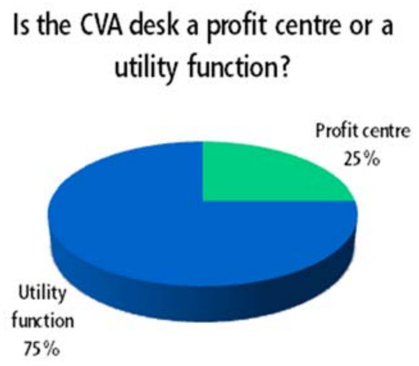
Utility vs. profit centre

The trade-off between conserving value (through hedging of mark-to-market and default) and generating revenue is challenging and presents potentially conflicting objectives.

Although from a superficial modelling perspective CVA looks a lot like a hybrid exotics business, there are obvious reasons why an aggressive profit-seeking business model is not common. CVA desks tend to be price takers not price makers; a lack of control over the trade inflow and a low access to flow / market intelligence makes it hard to position for profit. Moreover the history of the process often means that a CVA desk inherits a lump of legacy trading. And with an illiquid, thin market, hedging such exotic risk can rapidly eat away at any profit. It is perhaps not surprising then that 75% view their CVA desk as a utility function, as can be seen in Figure 4 below. Of those who disclosed budget information, most were in the zero to small negative budget range. We note two outliers with large negative budgets.

It is the exception to have a positive budget, perhaps reflecting a reluctance to provide explicit incentive to CVA traders to take outright risk positions.

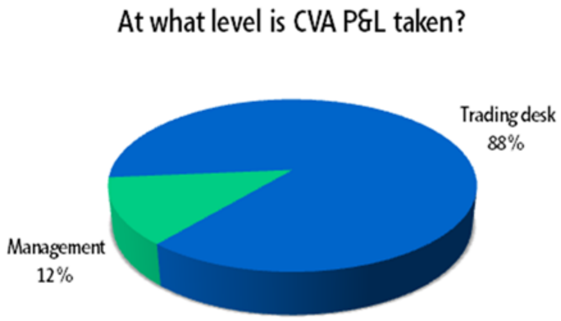
Figure 4



But the utility metaphor runs only so far.

As per Figure 5, most participants take CVA P&L at a trading desk level with only a small minority rolling P&L into management lines. The majority of participants calculate daily P&L – or at least (given the scale of the infrastructural challenges) have daily P&L in their near-term development plans.

Figure 5



Nearly all participants charge trading desks at inception. Once charged, CVA desks assume ownership of the counterparty risk until maturity. Alternatives to inception charging are much less common – very few participants continuously re-allocate the CVA charge throughout the life of a trade back to each product area with various ad-hoc schemes.

If an individual product desk opts to win a trade by reducing the theoretical CVA cost, it usually has to wear the loss itself. Sales are also explicitly equipped with standalone pricing tools, normally Excel-based or an intranet portal, increasing the apparent inevitability of the charge. Two-thirds of these tools allow for immediate netting and can produce marginal impact for new trades, unwinds or restructurings. Some participants pay sales credits to sales teams for CVA-reducing trades, but the actual rebates are not commonly paid to the trading desks.

It is interesting to note that whilst all participants have traditional credit limits in place, the presence of the CVA desk does not usually impact these limits. Credit departments do not seem to account for the benefit of CVA hedging yet, potentially to the detriment of new business.

CVA engineering

The most obvious feature of CVA is the extreme computational requirements of the process. The act of exploring the behaviour of every trade under a wide enough range of market and default behaviours cannot be a cheap process. Unlike VaR, where similar levels of complexity can be expected, the demands of active management of CVA can require considerably more precision, and worse with greeks and scenarios. Though historically, analytic approximations were more widespread, a monte carlo approach revaluing trades repeatedly across randomly generated scenarios is now the de facto choice. As mentioned in the introduction, merely obtaining a value for CVA can involve hundreds of billions of these valuations; an imposing engineering feat.

Modelling

From a modelling and implementation perspective, CVA remains an unusual challenge. Though it is not uncommon for the infrastructure to be borrowed from exotic or hybrid businesses, CVA viewed objectively as a 'payoff' remains stubbornly different to much path-dependent and exotic fare. It has a very particular interaction between the expected positive exposure and the default time leading to a high-level lack of path-dependence. And yet it needs to incorporate the path dependence of any exotic trades in underlying portfolios.

All of which makes for a distinctive challenge, to which the market responds with a distinctive mix of approaches.

Sometimes with surprising uniformity: like the idea of 'time-slicing' to reflect the non path-dependence of CVA. This approach is perversely resilient. Effectively universal in its usage, but all the same, a very particular choice.

And sometimes with a wide range of approaches: participants use multiple modelling choices with very different trade-offs between the simplicity allowed by the CVA 'payoff' and the complexity required for embedded trades. Despite difference in details, these multiple choices can be roughly divided in two.

Black-Scholes

The simplest category of modelling (Black-Scholes), similar to the early patterns in hybrid trading, is to use Brownian (or normal) processes for rate-like assets – IR and credit; and to use exponential Brownian (or lognormal) processes for asset-like assets – FX, equity and commodities. On top of this, the counterparty credit is commonly modelled with a non-stochastic hazard rate (applicable for 50% of the respondents). By pushing the trade-off so heavily towards the non path-dependent features of CVA, analytic solutions emerge to speed up vanillas. Even if a stochastic counterparty credit is invoked – again often with Brownian hazard rates for simplicity – this is still a modelling choice that allows speed. Whether parameterised with a historical or market-derived measure, this approach has considerable following.

One market view is that this is a rational choice – an engineering trade-off that reflects an underlying business with exotics that are either collateralised or small in volume. It also grows naturally out of the conceptual frameworks common in bank's implementations of VaR where multivariate normals were considered an acceptable response to the task.

But it remains a defiantly thin-tailed approach for a market with widespread evidence of extremes. Both historical time series for asset values and their implied volatilities show evidence of fat tails. CVA is not as obviously about extremes as say VaR or indeed PFE, but it cannot always avoid them. Not every portfolio's implied strike is at-the-money.

Moreover wrong-way (or right-way) risk is probably ill-served by a simple joint normal coupling between counterparty credit and the underlying assets – as acknowledged by the widespread use by participants of off-line ad-hoc pricing of wrong-way risk with jumps or other extreme scenarios.

HJM / BGM

Despite this, the second major category of modelling is not to inject, say, jumps or stochastic volatility in an effort to enhance the modelling or capture of extremes (some participants do this primarily to deal with CDOs as an underlying). Instead more complex modelling means moving to IR term-structure modelling – increasing the complexity of correlation and auto-correlation between different rate tenors with BGM- or HJM-like models. Two goals are achieved – first and most obviously fidelity to the endemic IR TARNs and spread exotics and secondly increased ability to capture variation in observed or implied volatility for different IR tenors. But at the price of increased complexity which, without extensive optimisation, comes at a cost.

Figure 6

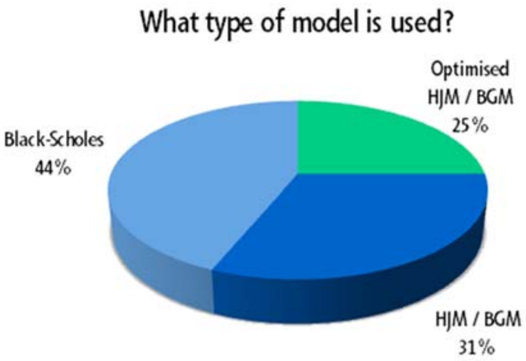
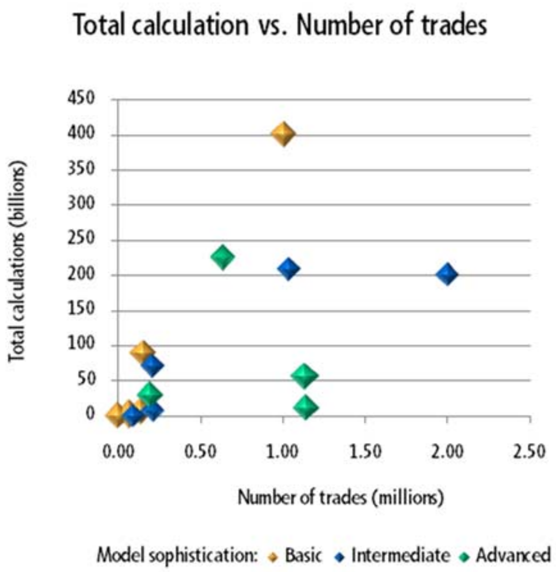


Figure 6 shows the highest level of modelling sophistication for each respondent. The modelling choice is approximately split between Black-Scholes and HJM / BGM approach. Roughly half of those using HJM / BGM apply a Longstaff-Schwartz type optimisation.

Computation

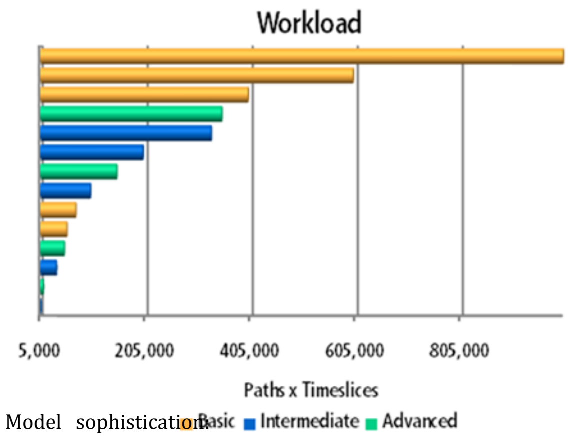
As might be expected given the range of portfolio sizes, from thousands to millions of trades, there is nearly a factor of a thousand from top to bottom for raw number of calculations (see Figure 7).

Figure 7



But even after compensating for the size of the portfolio, as per Figure 8, there is still a striking range of effective revaluations per trade, again from thousands to if not millions, then at least one million. These discrepancies can be explained by the complexity of the underlying portfolio, the (in-) efficiency of the algorithm and / or the computation limitation, which can result in poor convergence (many participants have either never examined convergence, or have no formal mechanisms for doing so systematically).

Figure 8

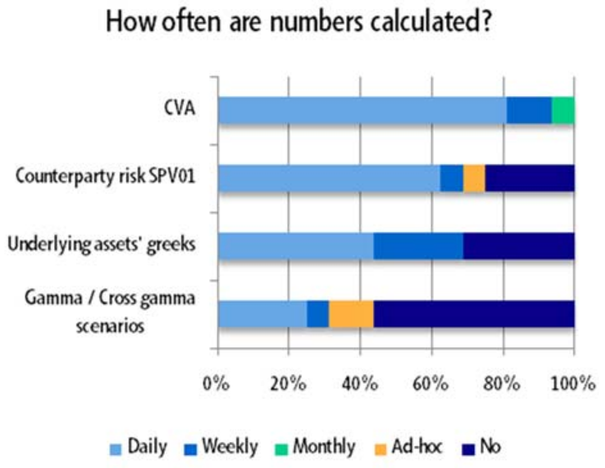


Respondents have been arbitrarily categorised by sophistication of their approach as follow:
Basic: *Exclude exotic products from the CVA platform;*
Intermediate: *Include exotics and use either Black-Scholes or HJM / BGM;*
Advanced: *Use American Monte Carlo optimisation methods such as Longstaff-Schwartz.*
Two respondents have been excluded from the computation analysis; one because they solely use analytical solutions and the other due to a lack of available information.

Given the near universal desire for daily CVA, compressed into a fraction of the traditional overnight batch to allow for as many greeks and scenarios as possible, it is not unheard of to see tens of thousands of processors employed. While it is clear that substantial efforts go into the optimisation of both vanilla and exotic trades, most banks have the twin issues of over-large portfolios of nominally fast vanillas, and nominally small portfolios of over-slow exotics. The figures show that banks which are prepared to (over-) aggressively optimise or even remove exotics altogether are capable of tens of thousands of valuations on a single compute node – evidence of considerable effort on the vanilla side. With exotics, the picture is much less clear. The tendency towards collateralisation for exotics – which can simplify and speed-up the calculation of their CVA – and the variation in relative numbers of vanilla and exotic trades makes it harder to see a clear pattern. However, it seems that banks prepared to invest in complex techniques such as Longstaff-Schwartz can still achieve net throughput at hundreds of valuations per node.

The strain also shows clearly in the pattern of calculation of CVA and any associated greeks or scenarios. Although calculating CVA at all was the price of entry into this survey – hence the 100% score in Figure 9 below– there is a range in frequency of calculations from daily to monthly. And though the particular nature of CVA modelling often makes counterparty SPV01s immediate, asset sensitivities are either infrequent, sporadic or altogether absent, with considerable implications for the ability to run CVA as an active trading business.

Figure 9



DVA redux

As discussed in the introduction, the subject of DVA provokes mixed responses. A fifth of the participants do not calculate it at all; just over a third do and take it as a desk P&L with the same status as CVA. Which leaves just under a half calculating it, but then not using it or at least not using it in the same way as CVA. Perhaps not surprisingly given different regulatory attitudes, there is a regional pattern, with DVA broadly taken as P&L in North American institutions and in some cases ignored altogether elsewhere. Those that calculate it but then do not take it as a desk P&L either push it up higher to a management line (often to be left unhedged and the corresponding rebate not passed back to the originating trading desks). Or they monitor it in the belief that the rebate provided by DVA should be the primary mitigant to CVA and though they often have their own proprietary mitigant – more on this in the following section – they keep an eye on DVA to calibrate their own adjustments.

Figure 10

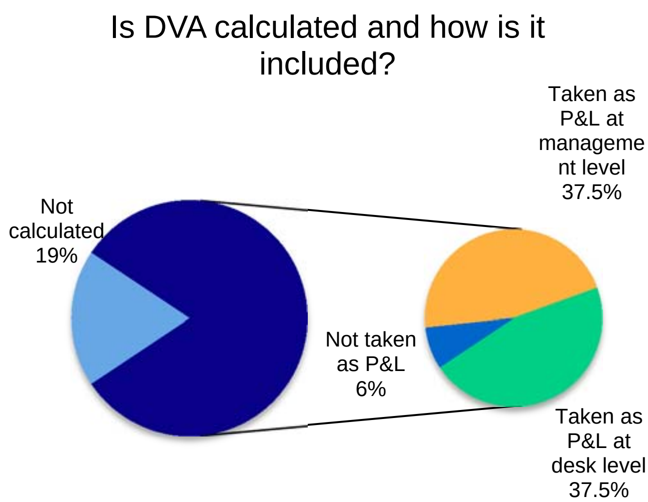


Figure 10 shows that there is no consensus approach to the handling of DVA, with some participants not calculating at all. Others that do calculate DVA tend to also take it as P&L either at management or trading desk level.

For those that take DVA as a full desk P&L, it is generally hedged; for those that don't, it generally isn't. Hedging where done is universally a macro hedge with reasonable diversification, such as an index. The crisis was unkind to banks that used more targeted hedges for DVA with low diversification and this seems reflected in current choices.

One interesting detail – despite the care lavished on the calculation of CVA and DVA, few calculate the effects due to the interaction between the two default times. Much of this can likely be attributed to low certainty on whether if one side defaulted, the remaining DVA (or CVA) effect due to the other would be recognised in practice during workout.

Fair value and CVA mitigants

Though CVA is on the face of it a mark-to-model adjustment, it does not exist in a vacuum. Institutions compete for trades and information leaks back to provide a signal as to fair value. CVA can be mark-to-market as well. But, as almost every participant acknowledges, this provides one of the central puzzles of CVA.

This market-derived CVA is persistently lower than the standard, risk-neutral model would suggest. The signal is faint. CVA is a small effect and it is a portfolio effect – in theory each bank could have a completely different pattern of netting. But participants believe that a difference can be seen, and moreover that a strategy to deal with it is essential.

As seen in Figure 11 these CVA mitigation strategies break into four:

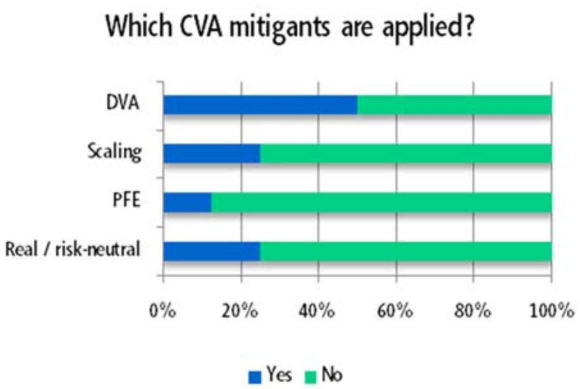
DVA. For all its issues, as mentioned above, a surprising number of participants use DVA (or at least some fraction of it) as the primary mitigant to CVA.

Scaling. A common strategy is simply to scale CVA via a factor; sometimes explicitly, sometimes implicitly by adjusting recoveries for the portfolios. Justification can be either in reference to market fair value, or to historical abilities in outperforming the market consensus during actual workout.

PFE. One of the more distinctive, if minority, approaches derives from the view that credit lines offered to the business by corporate credit can also be read as a form of transfer pricing. If, for example, a credit department limits usage via a PFE of ten million dollars or euros for a given counterparty, then that PFE can also be read as permitting a cheaper (or zero) price for the first ten million of exposure within the CVA model, providing the necessary mitigant.

Real / risk-neutral blend. Given that historically derived default probabilities are generally lower than market-implied levels, another approach is to back away from a full risk-neutral counterparty default model towards some blend of real- and risk-neutral. The exact blend is proprietary.

Figure 11



Wrong-way risk

Historically, most have ignored the coupling effects between counterparty spread movements / defaults and asset movements except for a small number of EM deals. Most participants now attempt an assessment of wrong-way risk via manual stress testing or ad-hoc analysis.

37% attempt to address this through complex modelling. But as might be expected, these are institutions with either strong business dependence on wrong-way trades or a hefty enough CVA platform / IT budget to permit an increase in model sophistication. Though the enhancements to modelling are superficially straightforward – introducing a stochastic counterparty credit either via correlated Brownian processes and / or correlated Poisson jumps – it is worth reflecting that CVA is often irreducibly multi-dimensional.

P&L explain

All participants have a P&L explain, out of which three-quarters attempt a risk-based P&L explain process – i.e. a meaningful attribution to greeks, limited inevitably by the frequency of generation.

Producing a meaningful P&L explain remains challenging. Even amongst those who seem satisfied, it is not uncommon to find development works being already scheduled or at least considered. The unexplained components of P&Ls are material in size. And added to this, CVA is downstream of multiple system feeds; any upstream error (booking, static data, netting, process or otherwise) will impact the CVA desk.

CVA & VaR

If producing greeks and P&L stresses the CVA process, the added burden of producing a VaR seems overwhelming. Naively repeating a quarter of a trillion valuations, say, two hundred and fifty times is not an appealing option. Fortunately, the well-trodden path of proxying awkward exotic trades via their greeks provides at least one way round this problem. Regardless, if a CVA trading desk produces volatility by marking-to-market, then introducing CVA into VaR seems hard to avoid. Importantly, if a CVA desk actively hedges, the hedging trades will likely contribute to a VaR anyway, adding not subtracting risk.

Figure 12

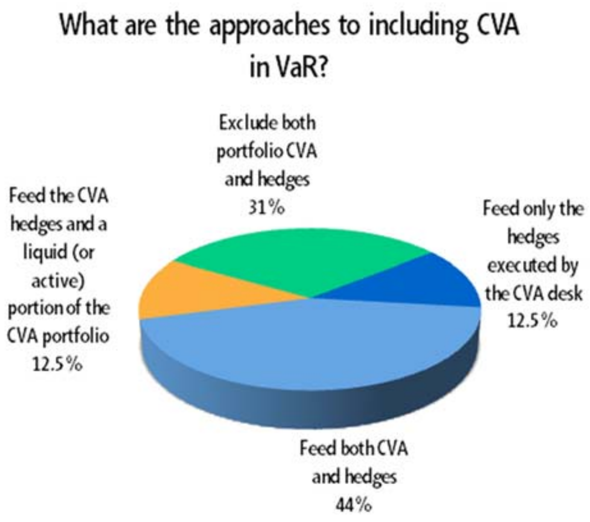


Figure 12 shows four approaches to inclusion of CVA into VaR.

Marks

Marking CVA is inextricably linked with managing it. Every change in a mark produces volatility and the various approaches mirror the requirement to control that volatility. Whether real or risk-neutral in nature, marking is not passive; it is part of a larger activity. And the first and most obvious challenge is providing a coherent framework to both mark and manage counterparty credit. Though a coherent strategy exists for managing marks derived from historical sources – effectively to sample over long enough time periods to smooth out changes – the presence of a liquid CDS market has had a striking effect.

Liquid names. Defining liquidity as the availability of a liquid CDS reflects a near unanimous consensus amongst participants. All but one institution in the survey has incorporated liquid CDS spreads into its marking schema, seemingly irrespective of their attitude to the real / risk-neutral split elsewhere in their modelling. Exceptionally, LCDS or bond spreads may be used to provide marks.

Illiquid names. With only hundreds of names having corresponding liquid CDSs but participants facing thousands of counterparties, the defining feature of counterparty risk is not liquidity but *illiquidity*. It is not uncommon that less than 20% of the counterparty names trade in the market. For some banks, this percentage falls to single digits. Whilst the percentage may be higher when considered on a CVA exposure basis, the overwhelming majority of exposure is to illiquid counterparties. CVA inescapably demands a coherent strategy to deal with illiquidity.

Almost universally, equivalence classes are defined on some combination of internal rating, industry and geography, and the liquid market is mapped into them.

Two sources of liquidity prevail.

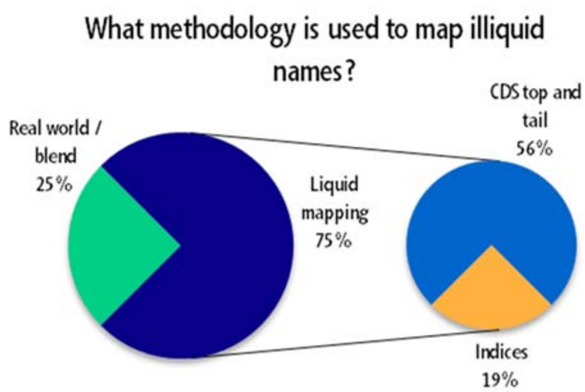
CDS top and tail. Within each equivalence class, some liquid CDSs exist. Outliers are removed and an average market spread is found. A corresponding hedging strategy then follows. This approach accounts for 56% of our survey responses as shown in Figure 13.

Indices. Whilst top and tail has the advantage of simplicity, patchy liquidity in the market leaves some equivalence classes near empty – resulting in low-quality marks and hedging. The main alternative is to use indices (although this was reflected in only 19% of our survey responses); usually Itraxx, CDX, HiVol, Xover and HY. The exact mapping is mostly proprietary, but the principle remains to form a weighting scheme that forms a believable macro hedge to spread movements.

Alternatively, a perfectly coherent approach exists for marking illiquid counterparties on a historical basis – and indeed this is the boilerplate approach to illiquidity for exotic derivatives. Historical marks can be smoothed to suppress the otherwise inevitable flood and retreat of CVA across a credit cycle.

The remaining 25% of responses reflected such an approach, including assessment of credit risk directly from Corporate Credit or an arbitrary blend of real and risk-neutral.

Figure 13



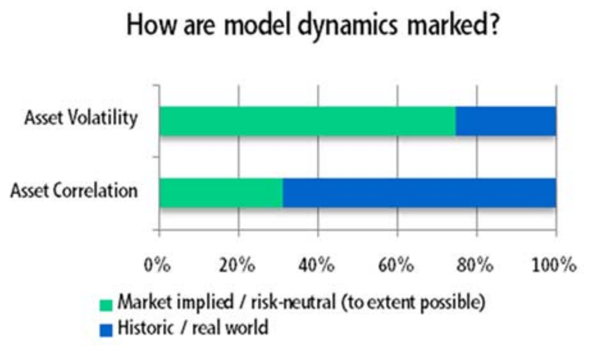
Exclusions. Whilst many institutions do not exclude anyone from CVA, there are participants that remove counterparties deemed to be low risk (e.g. sovereigns or similar), generally justified by reference to the institution's own geography and / or a sense that somehow the 'naïve' risk-neutral approach significantly overstates the risk. One participant excludes all counterparties above a certain rating threshold.

Recoveries. Recoveries used for CVA calculation sees a near even split between participants using, to the extent possible, market based recoveries and other participants using either historical recoveries, blanket assumptions or recoveries generated by corporate credit.

DVA. For those institutions using DVA, credit curves are typically marked using the institutions own CDS curve or in one instance by reference to a proxy basket.

Assets. Though the pattern for marking counterparty credit is distinctive, marking the underlying assets – IR, FX, equity etc – follows a more traditional schema. To the extent that participants follow a risk-neutral approach – and the majority do for the volatility of assets – if a feature of a given asset dynamic has a liquid market it is marked to it. If it does not, it is marked to history via the typical multi-year rolling window.

Figure 14



While it is not possible to operate within a fully risk-neutral framework, Figure 14 shows a trend towards risk-neutral for asset volatility. Asset correlation is notoriously more difficult to determine.

Managing CVA

Marking CVA is just one side of the coin, managing the volatility produced by marking is the other and the corresponding tools are *smoothing* and *hedging*.

Smoothing is straightforward. The longer the historical data series for a given mark, the smoother the end result and the lower the volatility of CVA. For banks which use historically derived parameters, simple window averaging across 2-4 years is a typical strategy.

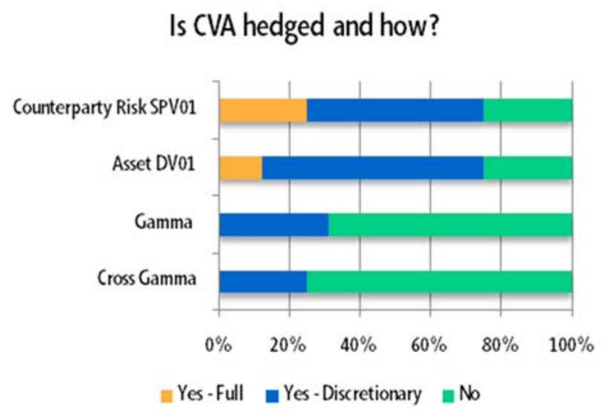
For **hedging**, the picture is more complex. For counterparty credit hedging the fundamental divide is between SPV01 and JTD hedging. For most participants the major portion of their counterparties have no liquid CDS market and hence have no direct SPV01 or JTD hedge. In such cases, similar to the marking strategies outlined above, proxy hedging of SPV01 risk via indices, bespoke baskets or a single-name CDS is widely used and in fair weather such a practice can perform acceptably. The idiosyncratic nature of JTD risk means no such proxy hedge is possible for illiquid names and the majority of participants accept the notion that active monitoring of this risk is required.

In the vast majority of instances, JTD for liquid names is not systematically hedged either – an SPV01 target is preferred. For liquid counterparties where a term structure CDS market exists the difference between JTD and SPV01 hedging could be *de minimus*, and for the small minority that do contemplate hedging JTD, not surprisingly, the general pattern is that lower rated counterparties attract more JTD hedges than higher rated counterparties.

Asset hedging tends to be better supported by liquid markets. To the extent that participants have access to greeks against asset values and volatilities, the majority of participants hedge at least first order risk.

Higher order hedging – gammas and cross-gammas – is limited to a minority.

Figure 15



The choice of which components to hedge is driven largely by the participants' ability to calculate the respective sensitivities

Figure 16

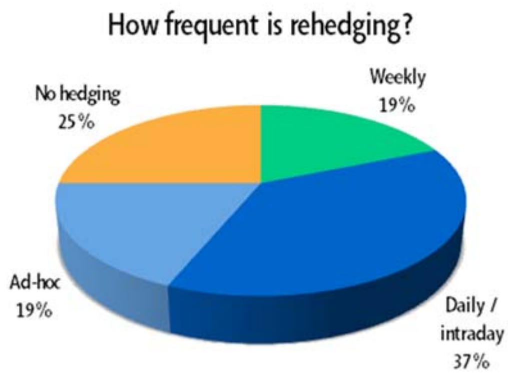


Figure 16 refers to hedging of SPV01 and other greeks, where applicable. Four respondents currently have no hedging operation, as they are in the early stages of development.

In addition, diversification may be used as a more passive approach. Most CVA desks are the forced recipients of the result of historic trading. Actual diversity in the portfolio may not be ideal as a result. While some participants actively seek diversification via interaction with sales and marketing, most appear to have little room for manoeuvre.

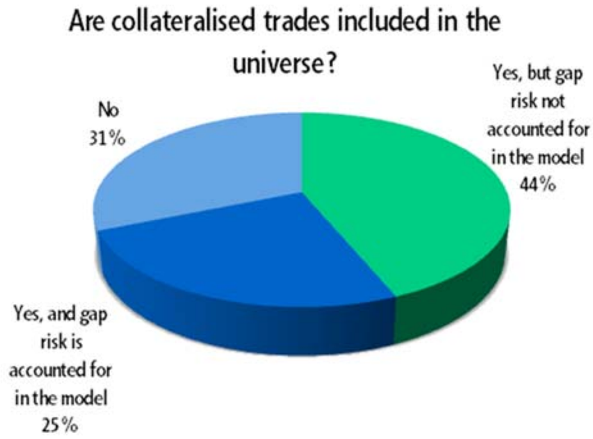
Internal ratings and Chinese walls

Mapping procedures based off internal ratings means that during normal operation, a CVA desk can encounter private side information via ratings changes. While some institutions explicitly protect the CVA desk by shielding rating changes – lagging the information for a period of time – the majority feel that the liquid / illiquid split is enough protection in and of itself. In the absence of a liquid debt / liquid equity market, the possession of private information on a given name cannot be used to execute a trade.

Collateral etc.

Almost universally, CSA information is automatically fed to the CVA framework either through the main trade booking system or dedicated databases maintained by the legal departments. This feed typically specifies required CSA information (including MTA, threshold and rounding) along with specifying which trades are governed by a given agreement. Despite the administrative challenge presented by data maintenance, the majority of participants are comfortable with the data quality and where problems exist they are managed actively.

Figure 17



Whilst the majority of respondents include collateralised trades within their CVA universe, only 25% account for gap risk within their models.

Strong collateralisation – zero thresholds and minimal rounding for example – provokes two responses. Some simply mark CVA for strongly collateralised portfolios at zero. But concern over gap risk prompts others to actively account for collateral slippage by modelling a 10–14 day period using the asset diffusions built into their models or, for a small number of participants, a specialised mix of diffusion and jumps.

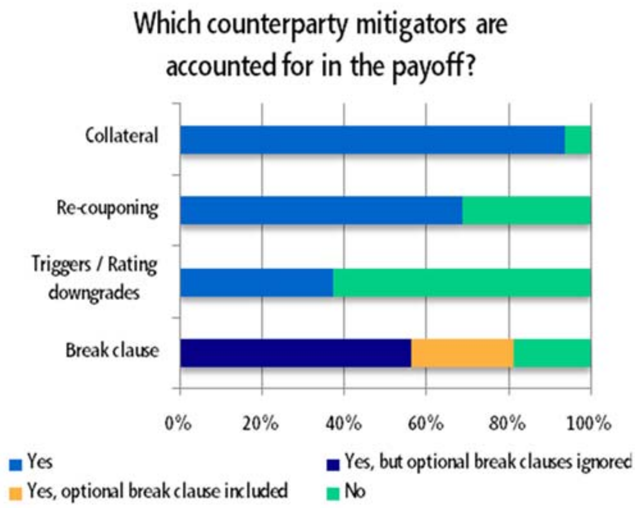
Not all banks maintain a collateral balance feed. Where relevant, collateral balance feeds are taken directly from the collateral management group.

Recouponing is largely captured by participants, when specified in documentation, either through separate models that then feed to the main framework or through approximations similar to collateralisation.

Triggers and rating triggers are generally much less likely to be accounted for in a systematic way although some institutions capture these within their model framework either through embedded transition matrices or other adjustments. The majority, however, either do not account for this or rely upon manual rebooking in the event of trigger breach.

As can be seen in Figure 18, the majority of participants model mandatory break clauses only, typically through a truncation of the exposure profile. Some institutions do attempt to model optional breaks also but this is less common and presents recognised problems.

Figure 18



Secondary mitigants, including set off, whilst not dismissed are treated with caution. The majority of participants will use this opportunistically where possible, subject to jurisdiction constraints, but recognition within the calculation is unusual. Where given, this is usually accompanied by a reserve policy.

3. Conclusion

As highlighted in this report, there are many challenges to running a fully functioning, fully integrated CVA platform. Even the most advanced participants acknowledge the room for further developments, both in terms of technology and liquidity.

By nature, CVA trading is amongst the most complex activities in a bank. The associated costs of providing meaningful risk and scenario profiles are, as a consequence, very large.

A CVA desk, being downstream of most systems, is the ultimate information recipient. Apart from the obvious resulting technological challenge, this generates a hybrid, illiquid and exotic risk, making risk assessment and hence efficient hedging strategies difficult.

CVA desks have limited control over their exposures, certainly with regard to the legacy books, as and when new asset classes are added to the CVA platform.

Smaller banks may find that their CVA exposure is less diversified than larger banks, suffering from a stronger regional or national client base, or dominated by strategically product focused counterparties such as structured finance, project finance, SME, etc.

Despite substantial investment and focus on CVA development, corporate credit departments and CVA trading desks are still typically viewed as separate risk management activities. While healthy dialogues are frequent in most banks, we have seen little evidence of integration and netting of credit exposures between the established credit limits and the CVA desk net exposures.

It is probably fair to assume that the CVA activity is seen by senior management and regulators as the active way to protect against counterparty defaults. The common approach is a risk-neutral based hedging strategy. However, the restricted universe of liquid CDSs not only creates difficulty in marking all names, but it also makes the majority of idiosyncratic risks unhedgeable. Proxy hedging generates basis risk, which some consider to be risk additive.

So if CVA desks cannot efficiently hedge jump-to-defaults due to their large illiquid exposures, what is their purpose and why do banks spend so much time and efforts in developing such a complex infrastructure?

Simply because an active management, armed with an efficient modelling platform offering greeks and scenarios, in spite of all its imperfections, is still superior in its ability to manage counterparty losses than an arbitrary reserve.

A number of smaller banks have not yet developed a platform capable of full charging for, and active risk management of, CVA. As a result, they continue to win derivatives business on the basis of omitting to charge for CVA. This is probably not sustainable.

Central clearing could potentially address some of the counterparty risks issues and is currently the subject of much debate. The benefits are obvious, although its implementation and efficiency still raises many doubts, not least the issues related to additional costs, the illiquidity of the majority of names and the non-standard features of most contracts.

In the short-term however, with so much at stake and so many uncertainties, it is hard to see the CVA role diminishing in importance. It seems that banks will continue their investment and development of their CVA platform with unprecedented vigour.