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xVA goes mainstream

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In recent years, financial-industry practitioners have begun to pay much more attention to economic costs embedded in derivatives transactions, for example to account for counterparty credit risk, funding and regulatory capital, which they previously ignored in valuations. To incorporate these terms, banks have started to compute and manage a set of valuation adjustments (xVAs) also prompting regulatory and accounting standards to catch up in recognising the same on the balance sheet.

As counterparty credit risk and funding practices converge in the industry, adjustments for regulatory capital and initial margin are still in flux. Regulatory capital and initial margin costs are difficult to compute precisely and hedge on the trading desk, complicating overall performance management and requiring closer cooperation between the front office, risk and treasury.

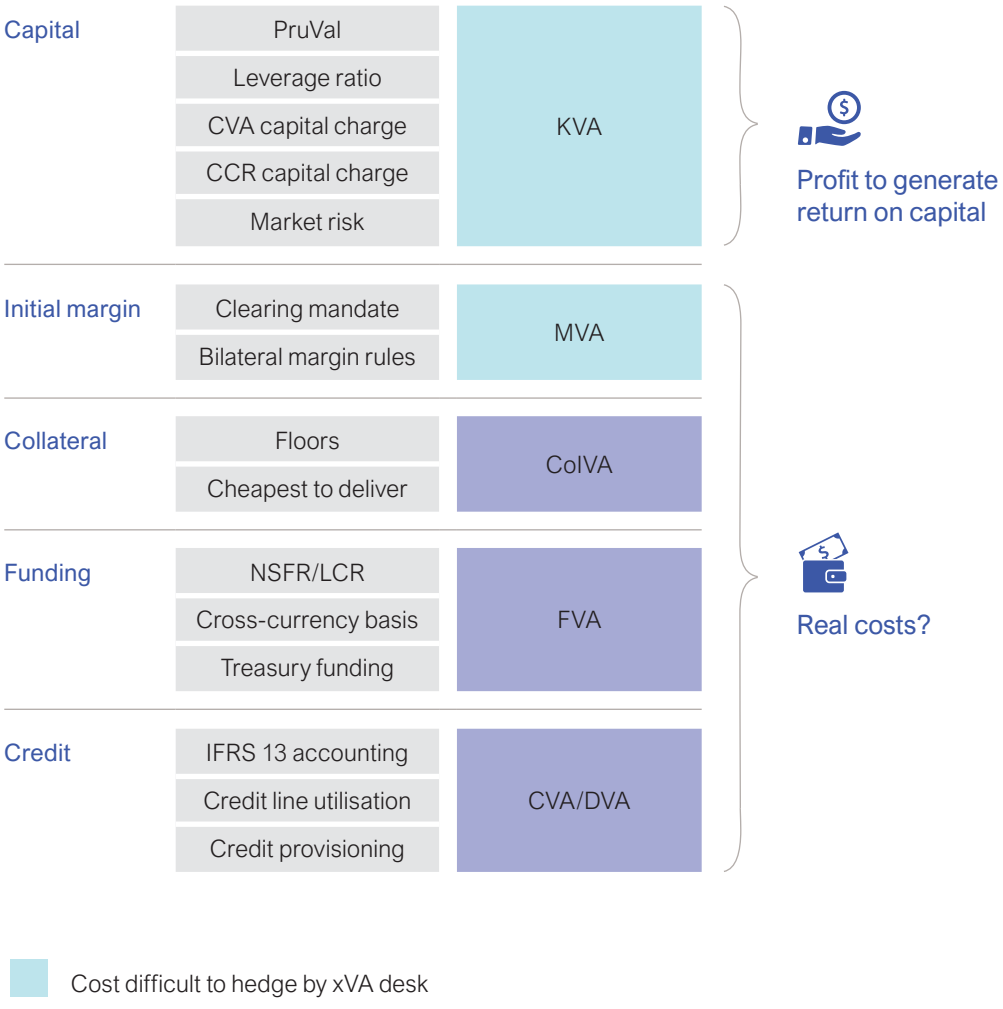
This paper examines the evolution of xVAs from bespoke and arbitrary adjustments towards more integrated – and standardised – components of value. We suggest that without a centralised framework around the entire xVA envelope that is connected to wider stakeholders through clear measurement and management roles, the markets business will face challenges in navigating current and incoming regulation. We also discuss ways stakeholders can get better insights into medium- to long-term profitability, including the need for enhanced governance, business steering and computation capabilities.

01 | The role of xVA

Traditional derivatives pricing and valuation generally only considered the impact of cash flows. For vanilla transactions, this problem was assumed in a relatively straightforward manner and was often simply a question of applying the correct discount factor. Valuation was considered difficult only where the cash flows were themselves more complex, such as being non-linear, contingent or multidimensional. These more complex payoffs or "exotics" were difficult to value, but their vanilla equivalents were assumed to be relatively trivial. Another facet of this pricing paradigm is that valuations can be considered additive, since cash flows are transaction specific.

In recent years, however, stakeholders have recognised that these assumptions do not hold: credit risk, funding, collateral and capital can all have significant impact on the valuations of derivatives. To classify a variety of valuation adjustments (VAs) that consider these factors, the industry uses the general term xVA. These valuation adjustments – although not always mutually exclusive – are generally defined as counterparty and own credit (CVA/DVA), funding (FVA), collateral (ColVA), capital (KVA) and initial margin (MVA). The anatomy of xVA (Figure 1) includes economic considerations, accounting and regulatory drivers.

Figure 1: Anatomy of xVA terms



The role of xVA can be represented as:

$V_{actual} = V_{ideal} + xVA$.

This allows the actual value (V_{actual}) to be represented as some ideal value (V_{ideal}), together with the relevant valuation adjustments. This separation is natural for several reasons:

- *Complexity.* As suggested by the name, V_{ideal} may be a relatively simple calculation, perhaps reflecting only the valuation of the cash flows, as in the traditional approach. It may also conform to a certain type of transaction, such as one that is centrally cleared[1]. On the other hand, the xVA components can be more complicated orders of magnitude and require knowledge of contractual terms together with the economic and regulatory 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 probably be made at transaction level, xVA terms must be calculated in a more portfolio-driven framework.
- *Organisation.* A cash-flow-driven valuation is suited to separate trading desks specialising in, for example, asset class, market, type of client and region. However, the xVA components necessitate management by a single desk, 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 various terms are treated. Knowledge of these requirements, both current and future, is a critical aspect of xVA quantification.

Broadly speaking, the assessment of xVA in pricing and valuation can be seen as an evolution towards the correct incorporation of future costs[2] (Table 1). Due to the mark-to-market treatment of derivatives, failure to account for such costs can lead to spurious initial P&L releases against future losses. Most Tier-1 banks have followed the best practices defined in Table 1 with the exception of KVA, where pricing is less rigorous and profits are generally still released immediately. It would seem likely that KVA management will evolve in the coming years, although it may be treated as "just another valuation adjustment".

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

[2] And sometimes benefits, as in the case of funding or incremental pricing.

Table 1: Evolution of xVA

	Traditional approach	Best practice
CVA	Trading and sales face uncertain future default losses.	CVA pricing and central management
FVA / MVA	Treasury charges term funding costs on an overnight basis.	FVA and MVA inception pricing and hedging with treasury
ColVA	The bank manages operational aspects of collateral	Collateral consistent pricing and active collateral optimisation
KVA	Businesses set soft return on capital metrics.	KVA priced directly into transactions and profits potentially released over time; KVA hedging possibly seen as optimal

02 | xVA as a bespoke adjustment

Since most xVA components are costs, they represent a drag on return on capital. Observers with a short-term view may see xVA as undesirable since the correct incorporation of future costs has a material impact on current profitability. In traditional derivatives valuation, any mispricing can be arbitraged, creating clear incentives to price correctly. By contrast, whilst xVA mispricing does lead to adverse selection, it cannot be arbitraged because it is specific to the bilateral relationship in question. This explains why some banks have been slow to incorporate adjustments that others see as market standard. Taking a short-term view, it is useful to think of xVA as a bespoke adjustment that may be ignored, or given a somewhat lighter treatment, rather than an integral part of pricing and valuation.

Whilst CVA has become relatively standard at large banks (with some notable exceptions [3]), certain components can be overlooked. 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 a transaction is still material [4], 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 irritation of non-chargeable valuation adjustment costs. For similar reasons, banks may not calculate CVA to central counterparties despite significant risks in terms of default fund contributions and initial margin requirements.[5]

[3] For example, see "Japanese Banks still not Pricing CVA", Risk, 2nd July 2015.

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

[5] Note that initial margin requirements are typically bankruptcy remote, but there is historical precedent that such treatment does not imply zero credit risk.

In fact, to a large extent, the question of whether to value xVA stems from whether it can be included in the price. Compare the use of FVA with MVA for assessing the funding costs of derivatives. Whilst accounting rules do not require an explicit representation of these terms in valuation, banks have been proactive in including FVA adjustments as deductions to the fair value of derivatives. This has been justified by the fact that FVA is evident in clearing prices and therefore constitutes a core component of the exit price. On the other hand, banks have not yet paid as much attention to the cost of initial margin (MVA) for centrally cleared and some bilateral derivatives transactions.[6] One possible interpretation is that FVA can readily be charged to uncollateralised "end user" clients, whereas MVA, arising more from interbank hedges, cannot.[7] Another consideration is that capital relief benefit in this regime may not be realised as directly as the funding costs associated with initial margin posting.

Broadly speaking, the assessment of xVA in pricing and valuation can be seen as an evolution towards the correct incorporation of future costs.

The treatment of xVA as a bespoke adjustment also applies to operational aspects and hedging. Supposing a bank carries out a 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's market risk may appear to be neutral, and it can easily lock in profit margin without major problems. This situation is not market risk neutral, however, due to xVA components in the transaction and its hedge, which are likely to be asymmetric in FVA and KVA.

Another example of the benefit of the separation is apparent when considering regulatory capital implications. Under the current regulatory regime, a capital charge is imposed 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 to provide capital relief. Any other CVA hedges are non-eligible and may therefore need to be included in the standard market risk capital calculation; this means they are capital *consuming* rather than capital *reducing*.[8] 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 only V_{ideal} to avoid capital charges from CVA hedges.

03 | xVA as an integrated component

Representing a valuation framework on the basis of idealistic valuation can sometimes be problematic, however. Take the funding of uncollateralised transactions and FVA as an example. One approach would be to represent all derivatives via a standard V_{ideal} (for instance using OIS discounting) and then make separate FVA adjustments. Uncollateralised transactions would have significant FVA components whilst the collateralised would have minimal or no FVA. The problem with this approach is that

[6] Today, only bilateral derivatives between the largest dealers are subject to initial margin requirements.

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

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

a bank's market risk would appear to be 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 banks might avoid this problem 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 (e.g., LIBOR plus a spread). This would not appear market risk neutral in the context of any hedges (which would probably be collateralised and thus discounted at the collateral rate without additional funding costs). Any FVA hedges could then neutralise this market risk. This treatment is not perfect – it does not deal with partially collateralised transactions[9] for example – but it is probably the most practical.

04 | The move to mainstream

We see pros and cons in treating xVA terms as either bespoke valuation adjustments or integrated components of value. After all, the industry is still exploring different aspects of defining and calculating xVA. But we expect that xVA will become more mainstream and less arbitrary and bespoke as time goes by.

For example, in 2015, the Basel Committee on Banking Supervision published a proposed change to the CVA capital charge.[10] 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 (SA-CVA) 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, it must have a *"dedicated CVA risk management function"* and a method to *"proxy the spread of an illiquid counterparty"*.[11] Without this approval, a bank must use a more basic approach to calculate its regulatory CVA capital, which is likely to result in a significantly higher capital requirement. As a consequence, banks with significant derivatives positions aspire to the more advanced SA-CVA approach.

In order to use the more advanced SA-CVA approach, a bank may have to take losses via a change to its CVA calculation methodology. Such losses are well-known[12] and may arise as a bank moves to a more precise calculation methodology from a more basic one, including aspects such as mapping default probabilities to proxy CDS curves rather than rating-based PDs, introducing risk-neutral exposure simulation, loss given default estimation and expansion of the counterparty universe. Using such an approach, the cost of moving to a market standard CVA approach can be seen via an offsetting gain in capital efficiency (Figure 2). Under a different accounting treatment of KVA (Table 1), this could even be seen as CVA losses being more than offset by KVA gains.

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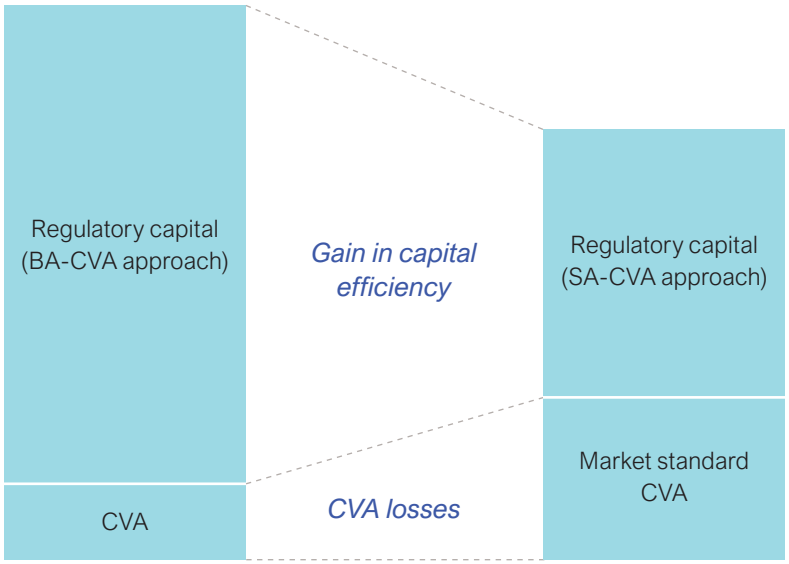
[9] It furthermore assumes a complete symmetry of funding costs and benefits, which few banks may consider warranted in all market conditions. The net stable funding ratio (NSFR) can also create asymmetry in funding, since derivatives' payables and receivables and posted and received collateral are not treated equivalently.

[10] Basel Committee on Banking Supervision, 2015, "Review of the Credit Value Adjustment Risk Framework", July. www.bis.org

[11] In other words, not to rely solely on historical default probabilities.

[12] For example, see "Traders shocked by $712m CVA loss at StanChart", Risk, 15th March 2016 and "ANZ's CVA Loss Flags Challenge for Regional Banks", Risk, 20th December 2016.

Figure 2: Illustration of the impact of FRTB-CVA requirements, which consist of a basic BA-CVA approach and standardised SA-CVA approach.[13]



Furthermore, the implication of the FRTB-CVA capital rules is that, unlike now, a bank has incentives 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.

Hence, CVA will continue to become less of a bespoke adjustment and more of an integral part of value, and the other xVA adjustments seem likely to follow gradually. In other words, xVA – as the core of derivatives valuation – is becoming increasingly mainstream.

05 | Future trends

Banks clearly need to embrace xVA as a core component of derivatives pricing and valuation rather than as a set of ad hoc adjustments. This applies to smaller banks that may not treat elements such as CVA and FVA properly, and it is relevant for larger banks, which may believe they are following best practice for most adjustments but still experience challenges regarding their treatment of KVA, such as a struggle to remunerate transactions that can improve return on capital.

Indeed, all banks are braced for an increasingly expensive capital regime via incoming requirements, such as the FRTB and the leverage ratio. Broadly speaking, this would seem to leave banks with two business models around xVA (Table 2). In the first "active" approach, xVA is embraced as the core of derivatives pricing and valuation; in the second "passive" approach, it is sidelined as much as possible. Under the latter approach, however, banks will be penalised more heavily by higher capital charges, operational inefficiencies, inconsistencies and adverse selection, and consequently may trade derivatives only where absolutely necessary.

[13] The increase when moving to a market standard CVA calculation would most obviously arise from the need to shift from rating-based to market-implied PDs.

Table 2: The potential impact of xVA on derivatives businesses.

Active approach	Passive approach
Central resource management (xVA desk)	No centralised approach
Risk-neutral mapping of "illiquid" credit spreads (requirement of SA-CVA)	Illiquid credit risk still dealt with in real world
Active and consistent management of CVA, FVA, MVA etc.	No active management
Lower capital charges (SA-CVA and perhaps IMM)	Higher capital charges (SA-CCR and BA-CVA)
Capital relief from hedges	No capital relief (hedges may use capital)
Long-term view on return on capital (KVA) vs. P&L	P&L centric
Correct and consistent pricing and valuation (novations, restructurings, backloading etc.)	Potential for inconsistency as xVA is not dealt with holistically
Optimisation regarding initial margin, capital, P&L etc.	Struggle to define what is optimal
Relatively globally or regionally active derivatives player	Only trading derivatives where critical

A bank's need to optimise xVA has directional and behavioural aspects. For example, a bank that believes the xVA cost of a transaction may be reduced in future by an offsetting transaction or restructuring may charge less. In general, this may be true for more sophisticated collateralised counterparties who may execute risk-reducing transactions or unwind or restructure existing ones.

On the other hand, less sophisticated uncollateralised counterparties are more likely to be directional in their hedging activity and less likely to restructure in any way. Hence, they may find optimisation possibilities in the collateralised space, such as minimising initial margin requirements with both bilateral and central counterparties and reducing regulatory capital requirements via multilateral trade compression services. These MVA and KVA mitigants may be factored into transactions, albeit by necessity on an ad hoc basis. On the other hand, uncollateralised transactions would seem to offer less possibility for such optimisation and future reduction of their CVA, FVA and KVA components.

06 | The challenge of steering markets' profitability

Banks on the active xVA journey are increasingly recognising the additional pressure on the return on capital of their markets business after the full envelope of costs is considered. The subsequent impact on profitability has catalysed significant restructuring pressure and investments in performance attribution and portfolio optimisation tools. It has also created a need for evolving organisational functions that are gatekeepers of profitable business opportunities.

Designing a performance management framework for derivatives is a complex task. It must bring together a wide array of stakeholders, and the target operating model must address multiple dimensions of the xVA challenge in the governance, business steering and technological infrastructure. A framework to evaluate long-term derivatives transactions should capture future constraints, for example, a complex undertaking in the light of uncertainties in regulatory requirements and future portfolio profiles. The measurement of individual transactions, portfolios and even entire business lines still does not consider the franchise value of individual clients taken across the entire bank, such as corporate or investment banking. The most sophisticated players have started to introduce return on client key performance indicators (KPIs) and return on capital at a high level. An unsettled accounting treatment of FVA, MVA and KVA, and a decentralised organisational ownership of underlying xVA cost components, can complicate the optimisation task.

The most successful banks will be those that fully embrace xVA as an integral component of the management of their markets divisions.

A centralized framework requires cooperation across many bank functions, including front office, risk management, treasury and finance. Consider the corporate treasury, which is typically responsible for securing term funding, ensuring liquidity for derivatives and ultimately transferring these costs to the business. These responsibilities are now becoming more complicated with the introduction of bilateral initial margin and the clearing mandate. In addition, treasury needs to factor in consequences of new regulatory requirements, such as NSFR, LCR and TLAC/MREL. Some banks have recognised the necessity to integrate treasury processes more closely within an xVA framework to address these challenges.

The extent to which a full-blown ALM framework can optimise funding costs for derivatives and improve the bottom line, in addition to setting the right incentives for the business, remains to be tested. In fact, many of the key xVA-related challenges are distributed across organisational stakeholders as shown in Table 3.

Table 3: Key xVA organisational stakeholders and challenges.

CFO/finance	How to implement correct fair-value reporting for valuation adjustments and manage trade-offs between accounting volatility and capital requirements
Markets businesses	How to incorporate economic costs into deal pricing and remuneration of sales and trading, in a way that meets portfolio KPIs and considers profitability of clients
CRO and capital management	How to develop transparency regarding economic and regulatory constraints and the required organisation structure and analytics to incorporate these into market KPIs
Treasury	How to adapt an ALM-like framework for derivatives to optimise collateral, funding, liquidity and hedging strategies

07 | How to organize derivatives businesses to reflect the xVA challenge

An active model for derivatives should address forward-looking xVA challenges, including governance, business steering and infrastructure. The active target operating model should be built on the core principles of centralising the measurement and management of the full envelope of economic costs and transparency across stakeholders to allow informed steering of profitability. It should also address key questions:

i) What is the new mandate of the xVA desk and its interaction with wider stakeholders, including treasury, collateral management, legal, risk management and finance?

ii) How are responsibilities allocated, i.e., who owns deal inception and trade negotiation, hedging, restructuring opportunities and closeout decisions?

iii) What is the optimal positioning of relevant functions and business steering? For example, should the xVA be positioned centrally within the market or treasury division?

iv) Should the xVA function be a profit centre or hedge centre?

v) What infrastructure investments are requirement vs. what can be rationalised across front office, risk, treasury and finance?

A successful performance management framework not only increases the understanding and transparency of profitability but will also be based on long-term economic profit and franchise value. It should target a range of objectives, including a reduction of markets' P&L volatility and the alignment of sales and trading compensation to economic value added.

To adapt, banks can: 1) set up a comprehensive business evaluation framework for existing and new businesses; 2) systematically compare actual P&L earned with economic and regulatory costs; and 3) incorporate franchise value and market limitations into any restructuring plans.

Given the significant changes in market practice and regulation relating to xVA and its broader impact on the banks' capital market activities, now is an ideal time for banks to reassess existing business models to develop strategies to drive profitability and meet capital targets.

08 | Conclusion

There is no doubt that xVA pricing and management has become a central activity for banks – and they must continue to work hard to stay ahead of the curve. As xVA becomes more mainstream, a lack of sophistication will lead to many problems within derivatives pricing, valuation and risk management. Ultimately, it will result in a business model that is likely to be unsustainable as regulations change. The most successful banks will be those that fully embrace xVA as an integral component of the management of their market divisions.

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