White Paper: OIS Discounting, Centrally & Non-centrally Cleared Derivatives, Collateral Management Up to Full Collateral Optimization

INTRODUCING THE CONTEXT

Collateral Management has become a key risk mitigation technic for counterparty credit risk at all financial organizations. Since 2007, the changing environment of financial markets has impacted collateral management, forcing bank departments to drastically improve collateral allocation, either at single trade levels or more efficiently, at portfolio level. Furthermore, continued use of bilateral collateralization plays an increasingly important role in risk mitigation.

Collateral is primarily used as a counterparty credit risk mitigation technic, allowing market investors to secure transactions through cash or securities. Improving collateral throughout bank processes becomes a necessity in evolving regulatory environments. Concentrating all aspects of collateral use into a single system allows pricing routines to account for accurate cost of collateral at trade inception at the level of discounted cash flows. A cost-effective methodology is consistently applied, regardless of embedded CSA complexity - from a single collateral type and currency, to a complex CSA incorporating rating-based threshold amounts using multiple currencies (aligned or not).

All functional aspects of collateral management, including OIS Discounting, Collateral Exposures, Initial Margins & Margin Calls, Independent Amount and Central Clearing, Collateral Re-hypothecation, are described in this paper, addressing mechanics of different building blocks of Collateral Management and Optimization.

Beside global collateral requirements, in 2011 the G20 initiated a program to ensure systemic risk is reduced. As part of this reform, all standardized OTC derivatives should be cleared through central counterparties (CCP) and non-cleared portions of the portfolio are subject to higher capital requirements. These aspects are addressed in this paper, by including IM/VM calculations and associated funding costs.

Based on this study, details of Collateral Optimization are explained in terms of collateral cost reduction, collateral benefit increase, and full collateral risk and stress management. This forms an efficient CRM strategy, allowing market participants to differentiate themselves from competitors.

Banks are forced to re-think internal processes when deploying new CRM strategies as changes redefine the initial purpose of Treasury or ALM Department functions integrating the necessity of dealing room awareness of Liquidity Value and Funding Valuation Adjustments.

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In conclusion, implementation of centralized credit risk-adjusted systems becomes a necessity, both for improved process efficiency and cost-reduction. Whereas a majority of financial organizations have been delivering heterogeneous IT solutions for fast time-to-market, **only 8% confirmed their global XVA system does not require further rationalization** and improvements. This indicates a significant gap in companies' perception of new regulatory initiatives and the real effort required to integrate such requirements into daily operations.

ANALYSING COUNTERPARTY PORTFOLIO STRUCTURE

Reviewing the annual ISDA margin survey of collateral use, one can deduce a typical bank derivative portfolio structure with different risk mitigation technics used to cover counterparty credit risk efficiently.

The following figure represents structures involved in this context, and depicts challenges necessary to harness global and efficient CCR Management.

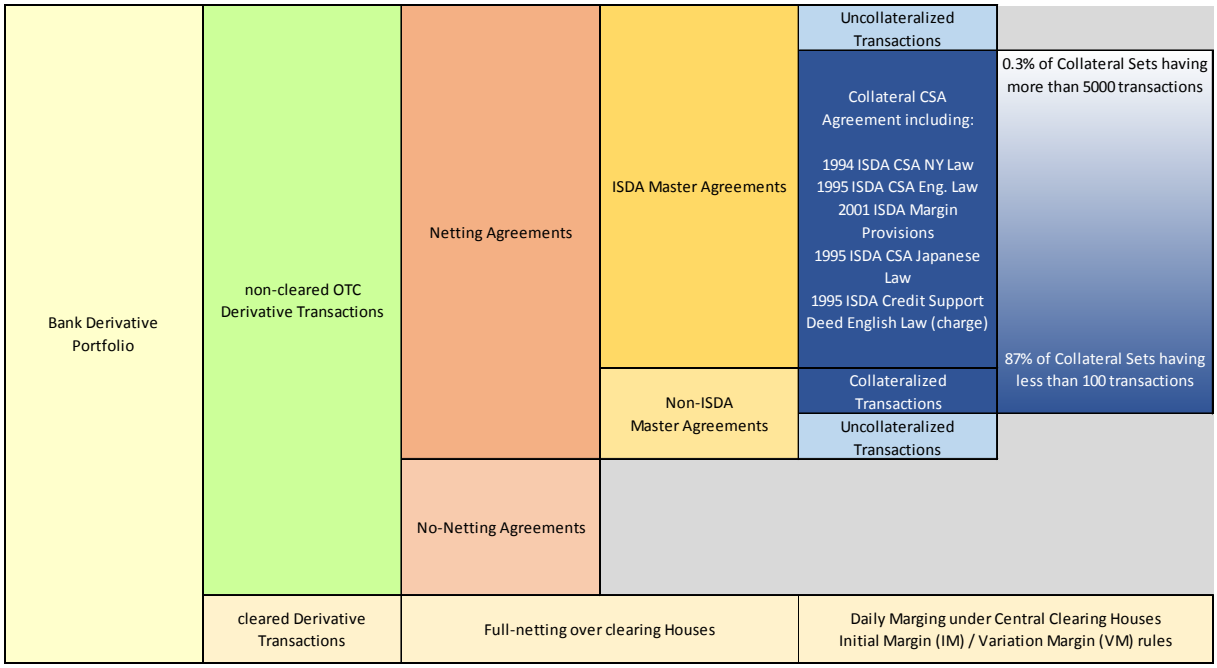

Figure 1: Typical Bank Derivative Portfolio Structure with netting & collateral silos[1]

The section below lists key requirements in addressing challenges of complex portfolio structure, and concludes with technical solutions.

[1] CSA is the most common collateral agreement signed between parties, but other local collateral agreements can be also used: e.g. the European Master Agreement (EMA), German Derivate-Rahmenvertrag (DRV), French Fédération Bancaire Française (FBF) and Japanese CSA.


- **Disparity in the size of collateral sets**

This figure also highlights significant dispersion in the size of the collateral sets in Bank Derivative Portfolios. The number of transactions varies from less than 100 to more than 5000, following the Pareto principle.

The size disparity in transactions under management quickly leads to structural challenges in solution design. Two problems need to be addressed simultaneously: managing large collateral sets with few transactions and small collateral sets with large transactions numbers.

- **Collocation of data for centrally cleared counterparty**

These considerations are even more significant in the case of central clearing, where tremendous efforts are required for aggregating figures for clearing house counterparties. In this case, data collocation is a must-have requirement otherwise computation time will be prohibitively slow, inheriting from the network latency of the bank.

- **Management of all legal aspects of collateral complexity**

Besides portfolio structure, each CSA triggers specific computations of expected collateral exposure (ECE), based on its own characteristics: IA[2], threshold amount, MTA, collateral exchange frequency, etc…

Banks may also have rating-based thresholds. This type of contract is frequently removed by legal departments but still requires proper valuation to assess embedded credit risk. Rating transition matrices need calibration for proper use within the credit model. This highlight again the need of concentrating all aspects of xVA and Collateral management into a single place where all relevant calculations will take place. These issues highlight the need to concentrate relevant calculations of all aspects of xVA and collateral management into a single system

It should be explicitly stated that IT architecture available for the risk valuation process needs to incorporate this constraint from day one (defined as the beginning of the design phase). Otherwise significant efforts and costs will occur during system operations as ad hoc solutions are crafted into underperforming infrastructure. This scenario will have detrimental effects on ROI. Massive redesign and high maintenance costs are often seen in in-house IT systems where architecture scalability and durability are sacrificed to time-to-market imperatives.

The following figure moves one step forward into collateral management and illustrates boundaries of Funding & Liquidity Value Adjustment definitions.

[2]Over the last few months a clear tendency exists to voluntary post independent amounts for reducing bank capital being held for their derivatives portfolio. It also helps Banks recycling their illiquid assets in a flexible way. As a consequence, having the ability to perform what-if scenarios on IA becomes a cutting-edge requirement, so corresponding RWA benefit can be straight forward assessed.

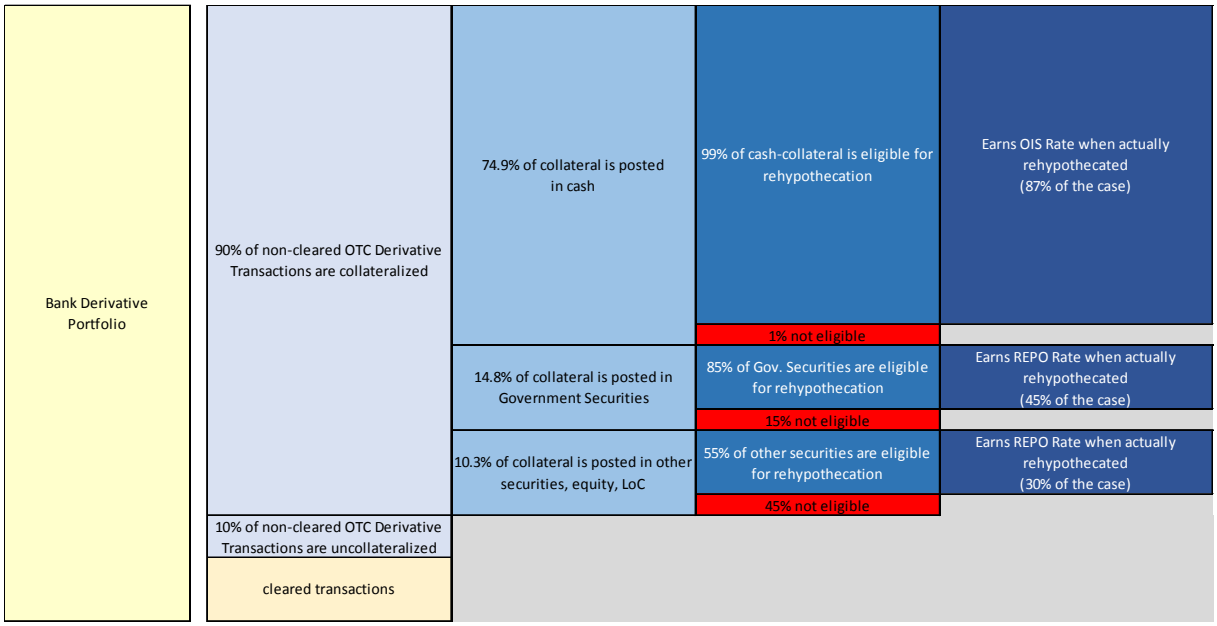

Figure 2: Exploring all collateral details embedded in CSA's

Going further into details of collateral management, and focusing on collateral sets illustrated above, the necessity of handling with accuracy the correct earning rate of CSA's becomes obvious.

Application of OIS discounting for pricing remains a theoretical ideal that is never sufficient in practice. On the other side, a full cash collateral model which fully captures the optionality associated with multi-currency CSA's and reflects also the opportunity of rehypothecation is far more complex to deploy bank wide.

Note the missing opportunity to rehypothecate collateral in eligible assets - the figure above demonstrates a significantly low level of collateral recycling, suggesting further optimization of collateral management is possible.

DEFINING WHAT THE FVA AND LVA ARE

Previous white papers[3] have focused on the direction of CVA / DVA and significant challenges to redesigning the valuation process. This paper introduces further adjustments related to funding and collateral costs to enhance details of process improvements.

This permits defining new requirements of even more global environments where all data converge into single points of computation.

[3] Please consult our web site for previous references on this topic: http://globms.com/en/news-and-articles

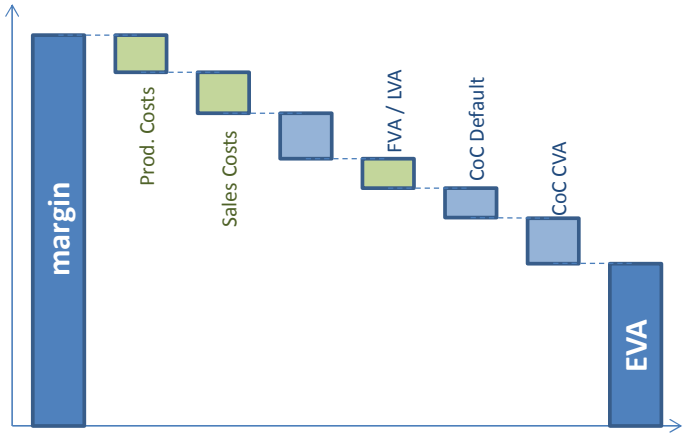

Figure 3: Waterfall representation of EVA components

The Liquidity Value Adjustment (LVA) is the discounted value of the **difference between the collateral rate and the risk free rate** on the collateral (typically the OIS Rate), and represents profit or loss produced by the liquidation of the Net Present Value of the derivative contract **due to the collateralization agreement**.

The collateral earning rate mentioned previously is a CSA characteristic and typically refers to corresponding OIS curves of the posted currency. In cases of security collateral, an implied collateral earning rate is deduced from a synthetic repo transaction, where the security haircut plays a key role, in terms of both potential over-collateralization and collateral retribution.

The Funding Value Adjustment (FVA) is the discounted value of the **difference between the real and risk free rate applied to the uncollateralized contract element**. It represents the profit or loss produced by the liquidation of the Net Present Value of the derivative contract **due to partial non-collateralization**.

The **Funding Value Adjustment** applies to the non-collateralized part of the operation and to uncollateralized transactions (typically coming from the corporate segment of the Bank's portfolio).

A new KPI for collateral efficiency is proposed as the ratio between FVA and LVA for collateralized transactions. In such cases, under-collateralization of net exposures due to threshold amount not being zero takes an important role – as well as for the IA & IM previously mentioned in this article.

Unsecured Funding Adjustment	**FVA**	Costs/Benefits from uncollateralized Transactions	EPE (hedge transaction) = ENE (transaction)	Apply Risk-free Rate	Secured Funding Benefit	typically collateral received from the hedging counterparty will be lent to secured counterparties or central banks @OIS rate
			ENE (hedge transaction) =EPE (transaction)	Apply Bank Own Funding Rate	Bank Funding Cost	when the hedge transaction has negative PV, the bank will need to fund collateral on the street to post it to its hedge counterparty
Secured Funding Adjustment	**LVA**	Costs/Benefits from Collateralized Transactions	EPE (transaction)	Apply Collateral Rate	Collateral Funding Benefit	when the transaction has positive PV, the bank will receive collateral from its counterparty and re-hypothecate it @OIS rate
			ENE (transaction)	Apply Collateral Rate	Collateral Funding Cost	when the transaction has negative PV, the bank will post collateral to its counterparty

Figure 4: Synthetic View of FVA and LVA segregation and their corresponding computation (standard method)

A first measure of "collateral efficiency" could be defined as the percentage of a dealer bank's collateral received that is actually rehypothecated (as depicted in figure 2); however, this metric is generally the responsibility of the Treasury desk. A more appropriate metric is based on collateral elements actually rehypothecated (when eligible) which then measure the efficiency of the CSA contract itself. A metric measuring collateral efficiency illuminates imperfections of the CSA, typically inherited from the cost of Independent Amount and Initial Margin, and over/under-collateralization inherited from threshold amounts.

The "advanced method" for computing LVA & FVA will not be addressed but it is likely that working at each simulation of the Monte Carlo framework produces more meaningful figures. This ensures that appropriate bank funding curves are used at each step of the calculation. It also ensures a funding spread built on top of a typical LIBOR rate follows relevant stochastic processes inherited from the underlying market curve.

The next graph displays an example of a LVA benefit originating from the positive part of the Expected MtM Profile with the remaining FVA component coming from the imperfect collateral exposure. The latter being mainly due to the minimum transfer amount of the CSA contract. Collateral efficiency as a function of the different CSA details (IA, threshold, collateral exchange frequency, MTA, collateral retribution rate) and risk-free rate level then clearly observed.

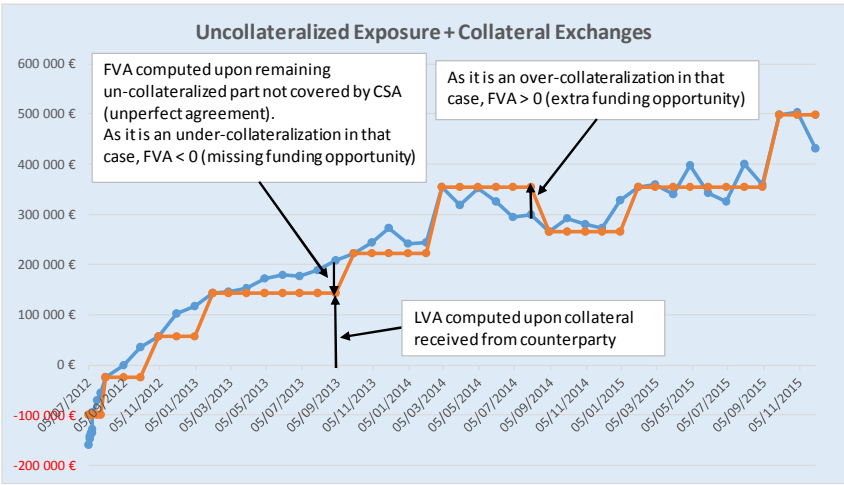

Figure 5: Case Study on a standalone Expected Exposure with an imperfect collateral (case of positive exposure)

In cases of positive Expected MtM on collateralized transactions, a pure collateral component (under an LVA indicator) and remaining uncollateralized part due to imperfect CSA are isolated. The uncollateralized parts can be:

- Either an **over-collateralization**, when collateral owned by the Bank is above the expected MtM at that point in time: this presents an extra funding opportunity
- Or an **under-collateralization**, when collateral owned by the Bank is below the expected MtM at that point in time: this is a missing funding opportunity

In both cases these remaining uncollateralized components should be clearly identified and managed accordingly.

The same logic applies in a reversed order for negative parts of the expected MtM:

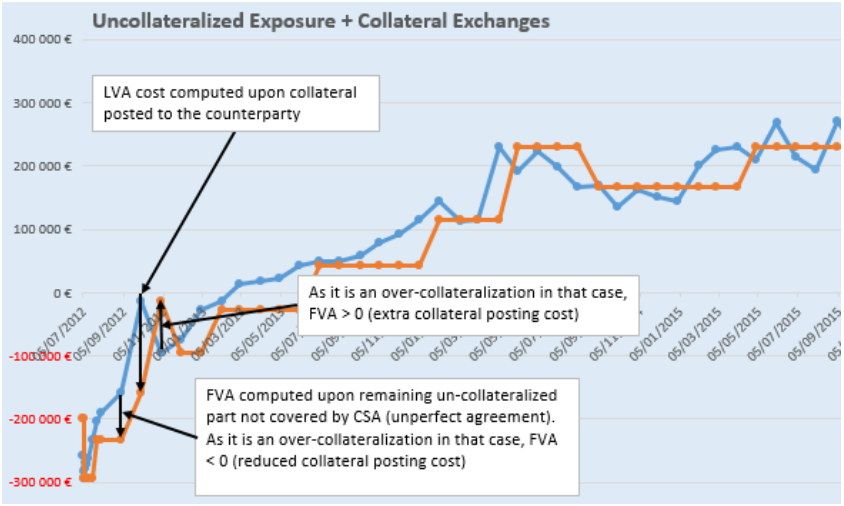

Figure 6: Case Study on a standalone Expected Exposure with an imperfect collateral (case of negative exposure)

UNDERSTANDING CSA STUCTURE: FROM SIMPLE TO HIGH-COMPLEX

- **A special attention to IM/VM requirements published by BIS[4]:**

  The IM requirements from ISDA are calling for imposing a universal two-way initial margin (IM) requirement on all covered entities (all OTC derivatives participants except for sovereigns, supranationals, central banks and non-systemically important corporates). On top of that, the second consultation excludes entities with aggregate notional amounts of less than €8 billion notional outstanding during the last three months of the preceding year. These 2 aspects should be clearly handled in the computation process.

In the context of IM / VM requirements, information systems should flag each portfolio counterparty eligible for IM calculations, and transaction types handled accordingly with the exception of physically settled foreign exchange forwards and swaps. Typically, dedicated threshold, MTA not exceeding 500T EUR and daily collateral exchange frequency are to be considered.

Management of IM / VM is a key element in Counterparty Credit Risk albeit the calibration of the Initial Margin itself is out-of-scope for this document. It is assumed this amount is defined by a dedicated system or credit department. In all other cases excluded from the BIS requirements, the usual collateral policy is applied based upon applicable bilateral agreements.

[4] Please read the Margin Requirements for non-centrally cleared derivatives on the following link (issued in September 2013): http://www.bis.org/publ/bcbs261.pdf

- **A GLOBAL PORTFOLIO VIEW FOR COLLATERAL AGREEMENTS**:

From a global portfolio view, 2 main categories are apparent:

1. **Transactions centrally cleared** through a CCP (typically LCH Clearnet or EUREX): The role of central counterparties ("CCPs") in clearing trades and managing collateral is of growing importance. 64% of ISDA members mentioned they were clearing members with up to 28 central clearing memberships reported.

2. **Transactions not cleared** will be divided into different sub-sections:
   - Fully cash-collateralized transactions with single currency (or multiple aligned currencies): pricing of such collateralized deals should be consistent with SCSA from Central Clearing Houses
   - Fully cash-collateralized transactions with multiple currencies (non-aligned currencies)
   - Non-cash collateral CSA's / asymmetric CSA's (typically done with SSA's)

The following picture provides a global summary of collateral agreements at portfolio level, demonstrating challenges of a full coverage management of collateralization across the entire bank's portfolio. Latter in this section, each case is described in detail.

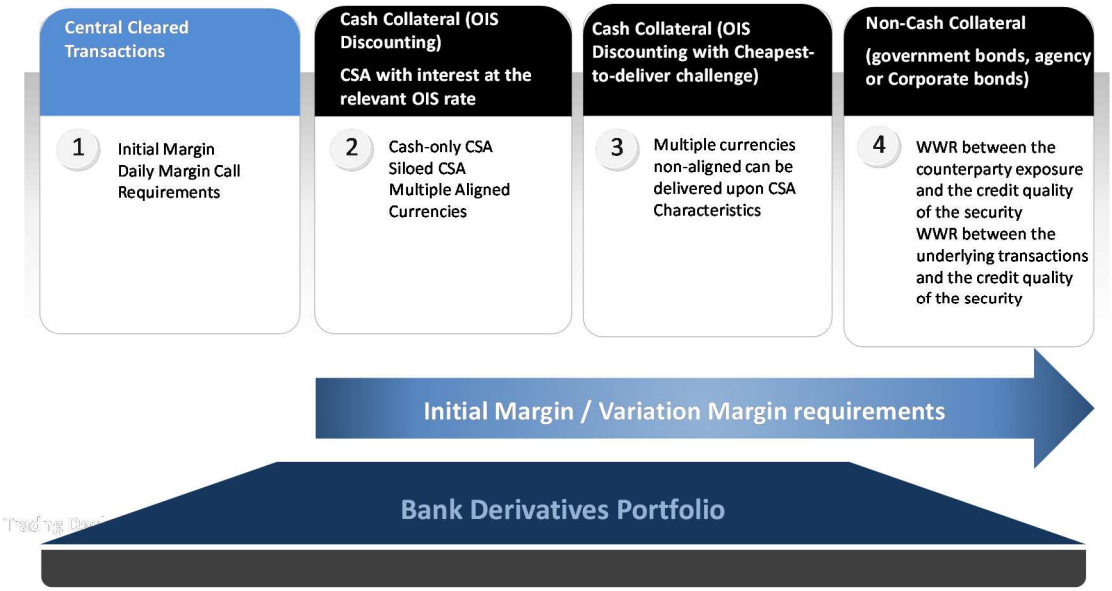

Figure 7: Collateral complexity reflected within CSA's

1. For **transactions centrally cleared** through a CCP:

Among firms responding to the ISDA survey 2014, 73.7 percent of all OTC derivatives trades (cleared and non-cleared) are subject to collateral agreements[5].

[5] Source: ISDA Margin Survey 2014


Trade compression has become a key battle field in OTC derivatives clearing (starting with LCH.Clearnet having revamped its offering). This is a crucial for banks for cutting gross exposure while attempting to leave the net risk position untouched. In that way, banks can significantly reduce their capital requirements under the Basel III framework.

Aligning collateral flows with future swap cash flows becomes crucial, so collateral effectively funds the future cash flows with minimal currency and basis risk. This is one of the underlying reasons behind ISDA's development of the Standard Credit Support Annex (SCSA), which like the cleared market, requires a cash only Variation Margin.

The increasing importance of maintaining economic consistency across cleared and non-cleared parts of the swap market becomes increasingly important to financial institutions. The generalization of SCSA, which produce bilateral collateralization essentially identical from a valuation point of view to those that apply in cleared venues for Variation Margin, makes even thinner the difference between cleared and non-cleared derivatives, both in terms of valuation model and in terms of collateral workflow (daily remarging in both cases).

Furthermore, systematic use of cash collateral also contributes to making both categories almost identical.

2. For transactions not centrally-cleared:

Transactions which are not centrally-cleared historically reflect bilateral agreements between counterparties. In 2011, the G20 agreed to add margin requirements on non-centrally cleared derivatives to the reform program, forcing banks to massively clear their OTC derivative portfolio, and contributing to reduced systemic risk.

According to the Bank for International Settlements (BIS), the standardized initial margin (IM) requirement should be expressed as a percentage of the current notional exposure, whereas it follows a 99th percentile of potential exposure in the case of the quantitative portfolio margin model:[6]

[6] Source : Bank of International Settlements – Margin Requirements for non-centrally cleared derivatives (September 2013)

<table>
<tr><th>Standardized margin schedule</th><th>Quantitative portfolio margin model</th></tr>
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The IM calculation reminds of the calculation of add-ons under the current exposure method (CEM).
Specifically, transactions are assigned asset-class and maturity-specific factors, which are applied to the corresponding notional. (These factors are quite large, more than twice as large as corresponding CEM factors.)
The resulting figures are summed across transactions within a netting set and are multiplied by the so called net-gross ratio (NGR), a factor ranging between 0.4 and 1 that is intended to reflect diversification effects.

<table>
<tr><th>Asset Class</th><th>Transaction Duration</th><th>IM Requirement</th></tr>
<tr><td rowspan="3">INTEREST RATE</td><td>0-2 Years</td><td>1%</td></tr>
<tr><td>2-5 Years</td><td>2%</td></tr>
<tr><td>5+ Years</td><td>4%</td></tr>
<tr><td>FOREX</td><td>n/a</td><td>6%</td></tr>
<tr><td rowspan="3">CREDIT</td><td>0-2 Years</td><td>2%</td></tr>
<tr><td>2-5 Years</td><td>5%</td></tr>
<tr><td>5+ Years</td><td>10%</td></tr>
<tr><td>EQUITY</td><td>n/a</td><td>15%</td></tr>
<tr><td>COMMODITY</td><td>n/a</td><td>15%</td></tr>
<tr><td>OTHERS</td><td>n/a</td><td>15%</td></tr>
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Is a risk sensitive approach that reminds of the internal model method (IMM) for counterparty credit risk.

Under this approach, IM is to be computed as the 99th percentile of potential increases in exposure over a 10-day period, calibrated to stressed market conditions. The model may reflect netting and diversification within but not across asset classes (which is different from the IMM, where cross-asset netting is allowed).

Use of a quantitative portfolio margin model will require supervisory approval.
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Figure 8 : Amount of Initial Margin required on a set of derivatives transactions upon each methodology

2.1 – Fully cash-collateralized transactions and the OIS approximation

The majority of CSAs stipulate only a single currency can be posted as collateral, with the corresponding interest rate on cash collateral paid at the relevant overnight rate – typically the EONIA rate would be paid on EUR collateral. This leads to discounting derivative cash flows with the corresponding overnight index, reflecting this collateral earning process. The collateral rate commonly defined in **Collateral Agreements (CSA) is the OIS rate**.

In addition, Standard CSA (SCSA) produces valuations that are exactly equivalent to LCH swap valuations. This convergence in valuation approach across cleared and non-cleared segments of the market is not coincidental and represents a mathematical continuity at each limit case.

However, since interest rates on cash collateral are based on OIS rates for the applicable currency, ISDA continue to observe a shift away from LIBOR towards OIS discounting in year 2014 margin survey (despite significant differences between geography, and asset classes being covered by this CSA Discounting).

As a consequence, the following statements are confirmed:

- LIBOR / OIS Spread is now a mandatory pricing element
- Whereas LIBOR / OIS Spread is usually around 10 basis point in normal situation, it rose to a **record of 364 basis point in October 2008**, so banks are now forced to reflect this embedded cost-of-collateral into their pricing (at least for the simple CSA's)
- OIS becomes the risk-free index for pricing


- OIS Discounting remains a simplistic approach for counterparty credit risk, as all CSA attributes are not reflected in pricing

2.2 Fully cash-collateralized transactions with multiple currencies (non-aligned currencies)

The previous section mentioned single currencies authorized in their CSA. A significant number of collateral agreements allow counterparties to choose from a list of eligible currencies. The ability to select a currency introduces optimization possibilities. Assumptions to measure and choose the cheapest-to-deliver collateral by CSA are implemented as party and counterparty will rationalize the most efficient option available.

2.3 Non-cash collateral CSA's / asymmetric CSA's (typically done with SSA's)

Collateral optimization goes through managing net collateral balance as a real KPI: clear identification of cash funding or security quality issues are now becoming a top requirement. This is even true in cases of asymmetrical CSA, and typically unilateral CSA, where banks only post collateral and never receive anything in case of market downside.

As a consequence, supranationals are becoming real funding eaters for banks that need to reflect this asymmetry in their pricing.

On the opposite side, aggressive CSA can force smaller counterparties to post cash-only collateral where the Bank can post both cash and security as collateral. Less frequently banks are applying higher haircuts on collateral received as collateral, presenting clear arbitrage of these securities on the repo market during typical collateral recycling process.

FORCING BANKS TO GLOBALLY RESTRUCTURE THEIR DEALING ROOM

Accurate pricing reflecting all aspects of counterparty credit risk, collateral and funding belong to the multi-faceted nature of the same problem. Whereas some of these aspects historically lead out of the front-office sphere, banks are now relocating these responsibilities to the trading floor so the drive for collateral optimization remains focused.

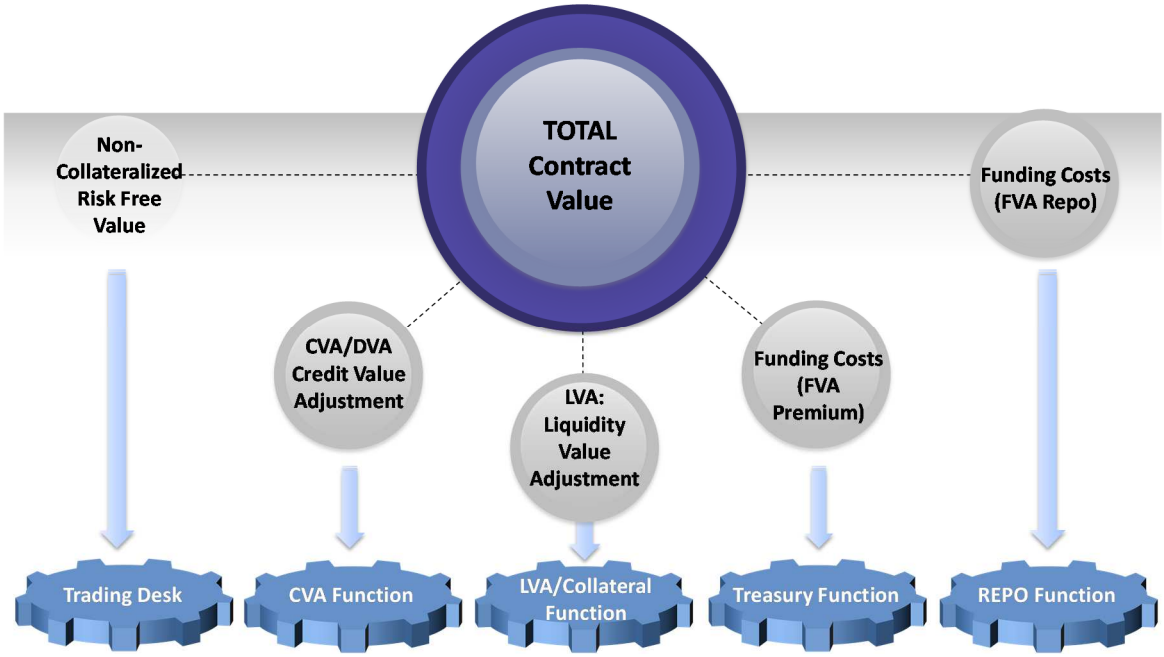

Figure 9: Typical split of each traded component across the Bank – An extreme case of activity splitting

Trading Desk

The derivative desk should try and replicate only the risk-free component of the contract, disregarding totally the different XVA components, and leaving them to the appropriate desks described below.

CVA Function

The CVA Function – through the setup of a dedicated desk or not – is the Counterparty Credit Risk Insurer of the company. Responsible for evaluating bilateral CVA (CVA – DVA), its mandate can also lead to an active management of this risk, by including hedging CVA to restructuring/novating Trading Portfolio. Hedging can include the primary credit risk inherited from the default probabilities of the portfolio counterparties, or the secondary risk arising from underlying market risks.

Collateral Function and Re-hypothecation:

The collateral desk is responsible for managing and trading the agreed collateral on an exchange. This function can go through a dedicated desk or embedded within another desk.

Some organizations are splitting the desk into 2 sub-activities:

- **Pure Collateral Desk**: Responsible for handling long & short collateral positions, and consequently managing "vanilla" cases of CSA agreements
- **LVA Desk**: Responsible for handling complex CSA, including partial collateralized trades, asymmetrical CSA and rating-based threshold amounts

In both cases, Collateral & LVA Desks are responsible for freeing up funds for further working capital requirements by the bank. Their mandate can be extended up to pure RWA Optimization in cases where banks are seeing collateral management as a real trading opportunity (this is particularly true for large- and medium-sized firms).

These typically transform security collateral into cash for bank-wide liquidity requirements. In many cases, Collateral Trading needs to be explicitly mentioned in the Credit Support Annexes, so both parties involved are aware of such trading developments.

Re-hypothecation means multiple uses of Collateral. Here the secured lender may extend the collateral posted to it, by either lending or posting it as collateral to another party, to fulfill its obligations. This is another type of development to free up collateralized capital. In cases of collateral trading, a number of legal issues arise, and fine print documentation to the Credit Support Annex (CSA needs to be respected. In contrast, Re-hypothecation is much simpler because of harmonization of systems and fewer legal complexities.

The re-hypothecation as collateral is not a direct transformation into cash as repo or central bank loans; it is a transformation "by replacement". It consists of posting the received non-cash collateral (instead of posting cash) as collateral on other operations.

FVA Function as an advanced Treasury Desk

The treasury lends money to and borrows money from other desks of the Bank at the risk-free rate. In the money market, the Treasury Desk pays the Bank Funding Rate, and may invest in risk-free assets receiving the risk-free rate. For this activity, **it is paid the FVA Premium**.

As these resources have become scarcer, banks have been forced to focus far more on management of capital and the return associated to it: A global trend for large financial institution is to implement central funding desks which cover potentially the following mandates:

- Funding Optimization for all derivative trades globally originated by front office trading desks
- Coordinating funding actions with the formal treasury department
- Actively managing RWA in cooperation with the associated risk department dedicated to scare resources

Again, funding should not be seen at trade level but companywide. Whether the funding component should be included in the final price of the transaction is yet another unresolved debate.

REPO Desk

Repo Agreements are some of the most widely used financial instruments in Global Financial markets. Similar to Collateral Agreements, the buyer of the securities enters into agreement to sell back the same securities in the future. The cash exchanges at a predetermined rate called the Repo rate.

The prime difference between other agreements and the repo agreement is that **although, the legal entitlement passes on to the buyer of the securities**, the interest and dividends are channeled back to the Repo seller.

The REPO Desk buys and sells the quantity of the underlying asset needed for dynamic replication. The REPO component of the FVA is attributed to the REPO Desk to account for the difference between the REPO Rate and the risk-free rate.

The haircut and the rate of a security loan are determinant in this business. Indeed, the value of a security loan depends on the securities' value, the security loan haircut and the security loan rate.

INTEGRATING AN EFFICIENT COLLATERAL MANAGEMENT SYSTEM BECOMES A NECESSITY

A global collateral management system should interact with all front-office systems as well as other downstream applications. The system should be centralized in order to process – most of the time under near-time constraints – overall enterprise trading volumes pertaining to Collateral management, and enhanced trade volumes. The data transfer to different modules in the Collateral Management system should be smooth, and able to collect information at portfolio levels, creating a significant cost-saving scale effect for the whole bank and its legal entities.

Scalability

Collateral volumes and agreements have both increased at a rate of around 40% per annum over the previous decade. Organizations have also evolved more enhanced and efficient collateral management techniques. As a result, Technology in Collateral Management systems is capable of handling increasing volumes of data, as the collateral / funding functions and organization scales up.

Messaging standard

Standardized Communication Processes with counterparties is an important aspect of a Collateral Management System. This also includes the bank's own organization both internally and through its legal entities.-. FpML becomes the standard of choice among most organizations, as it does not need a network or specific transport mechanism.

FpML enables counterparties to transfer information electronically in a format that allows the data to be read by other similar systems, thus improving communication between counterparties. As

FpML is an ISDA standard, the globalization of its usage is likely, both in term of trade representation and work flow description.

Trends in Active Collateral Management

The end result of managing Collateral is to improve efficiencies of both counterparties, in the areas of better risk management, and enhanced return on capital invested. Leading banks are looking for significant ways to improve existing systems: Improvements in current systems effectively lead to a decrease in capital allocation, and lower operational risk through automation.

These remarks are linked to the concept of Administrative AVA, which is one of nine AVA components mentioned by the EBA in the EU Regulation No. 575/2013. Admin AVA should include staff costs, fixed costs, and any admin costs that occur over the expected transaction life cycle.

Cross-product collateralization

As the decade has seen phenomenal growth in derivative instruments and similar structured products, Cross Product Collateralization is another feature considered an important trend in Collateral Management. Cross product Collateralization involves creating a Credit support vehicle that takes into consideration any type of transaction undertaken between the parties, and is used to calculate collateral for the transaction.

This is benefited by economies of scale for the company, and supports group -wide collateral management policies.

New Requirements combining Trading / Risk Management for Collateral

Either required by the Collateral Desk alone, or as part of common needs for CVA / LVA Desks and Risk Management, organizations have now advanced and defined complex requirements for managing collateral portfolios.

Banks need to continually assess collateral impacts on balance sheets. As a direct consequence, advanced simulation capability to evaluate Collateral Stress is now becoming a daily requirement. This is the key technical prerequisite for optimizing collateral management:

- **Applying different haircuts on security posted as collateral** (typically applying different haircuts on Government sovereign securities for instance or pushing all collateral upwards by 5 points on average to simulate an EU Crisis).

- **Applying a higher/lower rating security collateral** to assess the LVA/FVA costs/benefits.

- **Applying stress on Thresholds**, Independent Amount and Variation Margin to evaluate impact of rating-based thresholds in CSA's.

- **Applying stress on security collateral**: ability to test when received collateral becomes ineligible, and further managing LCR.

- **Computing the Cheapest-to-Deliver Collateral** being posted in a fully-cash-collateralized transaction, by providing an NPV for each currency available in the CSA contract.

- **Opting to use the available collateral** on balance sheet.

- **Increasing effective re-hypothecation** of collateral where CSAs allow re-hypothecation.

- **Systematic limit processing** forcing collateral posting once a funding rate hits a certain level applying the same mechanism for security rating quality down to LCR management.

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CONCLUSION

An Accenture/Clearstream report in 2011 estimated up to 15 percent of collateral available to financial institutions is left idle, costing the global industry more than $5.6 billion a year.

As a consequence, collateral management has moved from passive element in portfolio management to an optimized must-have for all market players, regardless of organizational size. Moving to trading derivatives through central counterparties (CCPs), plus all new constraints of the Basel III Framework (increase of capital costs) will definitively increase collateral costs for all investors.

Consistency between the pricing of collateralized and uncollateralized trades is likely to be a topic for a while, thus a unified framework for the computation of xVA and collateralized trades is needed.

Managing collateral through regular collateral systems becomes less effective and introduces legal data duplication across systems while counterparty credit risk requires the use of advanced models for reflecting collateral policies with accuracy. Collateral systems are historically bounded to collateral position keeping and basic collateral concentration metrics.

Keeping in mind these aspects leads to the following requirements (listed from most basic to most advanced):

- Knowledge of collateral eligibility
- Compute corresponding costs upon collateral assets
- Cheapest-to-deliver
- Full knowledge of CSA details
- Centralized collateral management across all business lines
- Smart Collateral re-allocation and re-hypothecation management
- Cross-product netting at portfolio level
- Elaborated What-if Scenarios on all possible collateral attributes

For these reasons, investing in an architecture globally designed for answering concomitantly various aspects of XVA (including Funding) and Collateral Optimization, reduces IT costs for banks and permits more efficient portfolio management.

Furthermore, new regulation (EU) No. 575/2013 for Capital Requirement Regulation, force Banks to report AVA Adjustments, either through a “Simplified Approach”, or by using a complex CORE Approach based on 9 separate adjustments.

A detailed discussion of these components is not presented but one of them, largely treated in this paper, is the ability to reflect uncertainty in investing and funding costs used to assess existing prices. All AVA Adjustments requirements are depicted in the next paper, completing the picture of the necessity of a cross-platforming approach for global risk.

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Global Market Solutions specializes in providing technical and functional expertise on various areas, offering a global consulting approach to customers.

GMS has expertise on Summit, Kondor+/KGR/KTP, ActivePivot and Orchestrade.

Our business model focuses on providing Solutions combining Business Expertise (Counterparty Credit Risk through CVA valuation, pricing integration & validation), Project Management and Software components.

Through continuous improvement cycles, we offer the most suitable services, covering transverse change management, Business and IT process redesign, and bespoke software components so the whole process chain is covered.

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We provide the flexibility required in the Investment Banking environment, combined with high capability to deliver complex IT Projects in a heterogeneous environment.

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