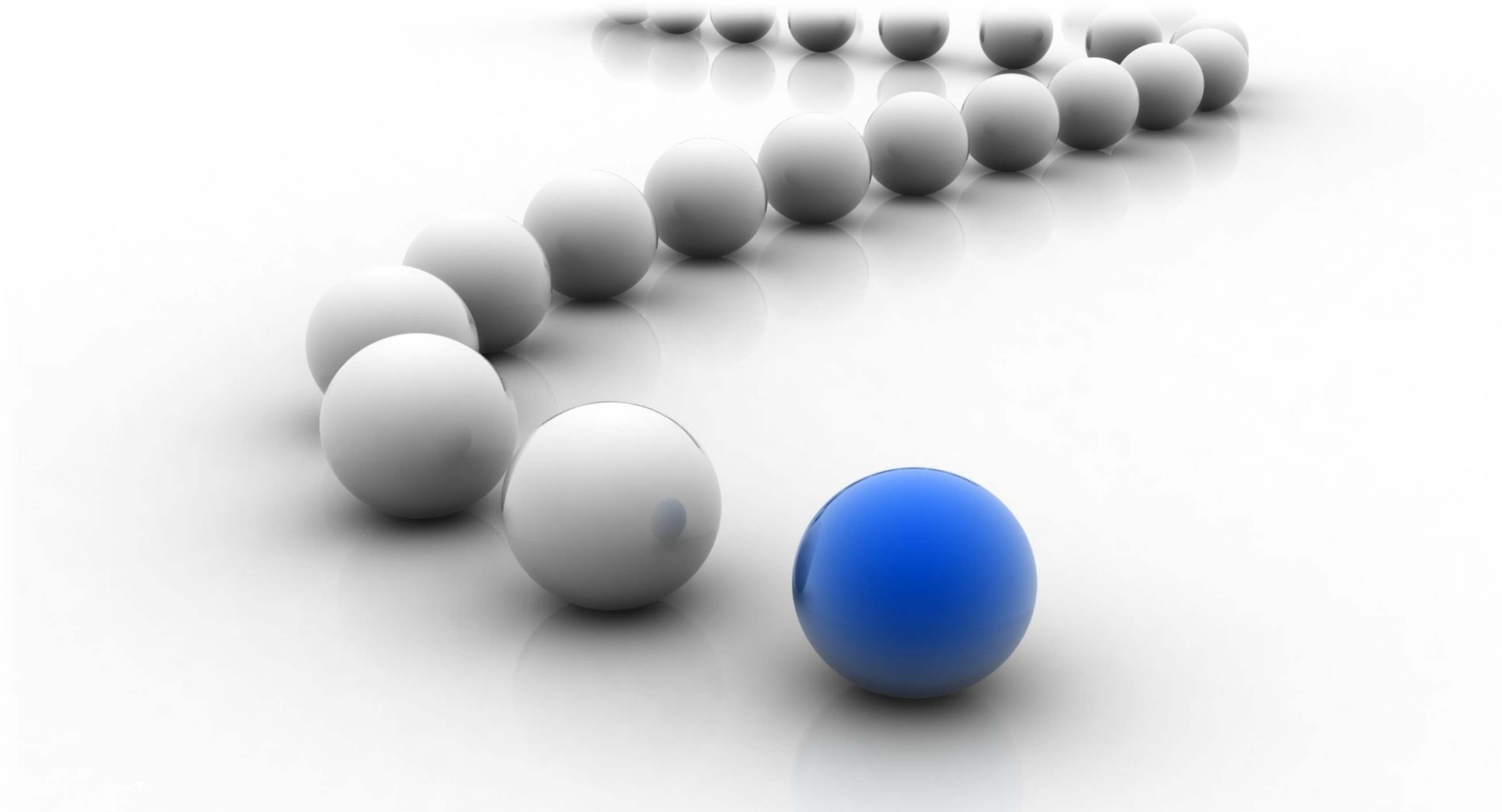
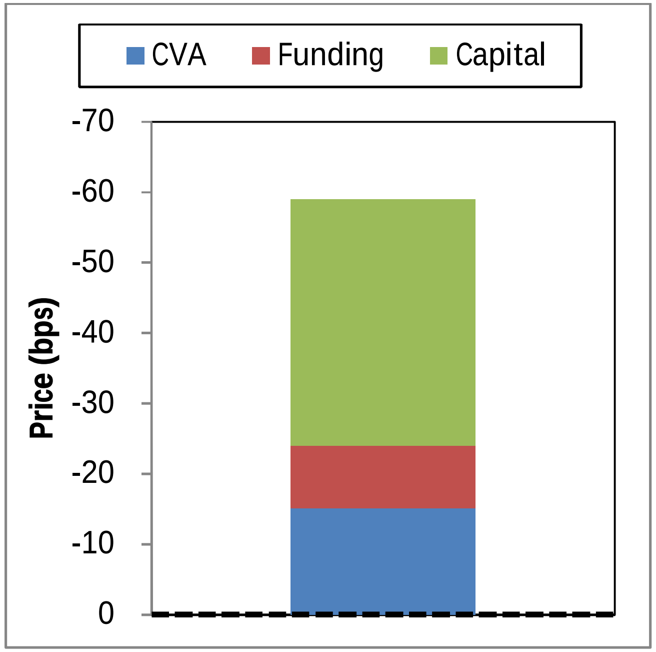


# Linking FRTB with CVA Capital

Jon Gregory

## Counterparty Risk and Capital

- **Counterparty risk was seen as a major contributor to the crisis from 2007**
- **Not surprisingly, increased capital requirements were introduced via Basel 3**
  - This involved changes to existing methodologies (e.g. stressed data, margin period of risk)
  - And a completely new capital charge
- **Counterparty risk capital is a very significant driver in OTC businesses**
- **Banks traditionally warehoused much of their CVA but this has changed with most banks having active CVA desks**
  - A key question is therefore whether capital charges react appropriately to the active management of CVA




Uncollateralised
20-year IRS
double-A counterparty

## Overview of the Problem

- **Suppose for a traditional market risk VAR model regulation required:**

- **All pricing formulas would be regulatory driven and not a bank's own**
- **Pricing models would not be calibrated to current volatility surfaces**
  - Historical volatility could be used instead of market implied
  - In either case, a stress period must be included
- **Some risk factors would not be allowed to be simulated and/or associated hedges for such risk factors would not be offsetting**

- **This gives a rough idea of the problems banks face with the CVA capital charge**

*Counterparty risk capital requirements*

*The CVA capital charge*

*Exemptions and criticisms*

*Impact of CVA hedging*

*New CVA risk framework proposed by the BCBS*

## Counterparty Risk Capital

- **There are two main capital charges that relate directly to counterparty risk**
- **Default risk capital charge (sometimes called the CCR capital charge)**
  - This has always been present
  - It accounts for default risk and some credit migration risk
- **CVA capital charge**
  - This was introduced in Basel 3
  - It accounts for CVA volatility risk (credit spread volatility)
- **Difference methodologies exist for the computation of these capital requirements**
  - CEM, SA-CCR and IMM (general definition of exposure that is used for both capital charges)
  - Advanced and standardised approaches (CVA capital charge)

# Overview of Counterparty Risk Capital Charges

<table>
<tr><th></th><th>Default Risk Capital Charge</th><th>CVA Risk Capital Charge</th></tr>
<tr><td>Banks with IMM approval and with specific risk VAR approval for bonds</td><td rowspan="2">IMM methodology for EAD</td><td><u>Advanced method:</u><br>• uses banks VAR model for bonds to model spreads<br>• eligible hedges (CDS single-names and indices) can be included<br>• sum of normal and stressed VAR</td></tr>
<tr><td>Banks with IMM approval only</td><td rowspan="2"><u>Standardised method:</u><br>• Variance type formula assuming 50% correlation with global index giving split into idiosyncratic and systematic spread components<br>• Hedges included</td></tr>
<tr><td>Other banks</td><td>Simpler (non-IMM) method<br>Typically CEM<br>SA-CCR (from 2017)</td></tr>
</table>

*Counterparty risk capital requirements*

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## Basel III and CVA capital

- **BCBS Consultative document (December 2009)**
  - "Roughly ***two-thirds of CCR losses were due to CVA losses*** and only about one-third were due to actual defaults. The current framework addresses CCR as a default and credit migration risk, but does not fully account for market value losses short of default."
- **This seems to identify the need for a new capital charge**
  - "Banks will be subject to a ***capital charge for potential mark-to-market losses (CVA***) associated with a deterioration in the credit worthiness of a counterparty."
  - The capital can be reduced by hedging with credit default swaps
- **Two options**
  - Standardised approach (simple formula)
  - Advanced approach (VAR type calculation)

## Standardised Approach

- **Normal distribution VAR approach based on the standard deviation of CVA**
  - 99% confidence level, 1-year time horizon
  - Included single-name and index CDS hedges (see later)

$$Capital = 2.33\sqrt{h}\sqrt{\overbrace{\Big(\rho \underbrace{\sum_i w_i N_i}_{\text{Counterparty weight by rating}} - \underbrace{\sum_{ind} w_{ind} M_{ind} B_{ind}}_{\text{Index hedges}}\Big)^2}^{\text{Systematic term}} + \overbrace{(1-\rho^2)\sum_i w_i^2 N_i^2}^{\text{Idiosyncratic term}}}$$

Correlation parameter (50%)

Counterparty weight by rating

Index hedges

Single name hedged notional

## Advanced Approach

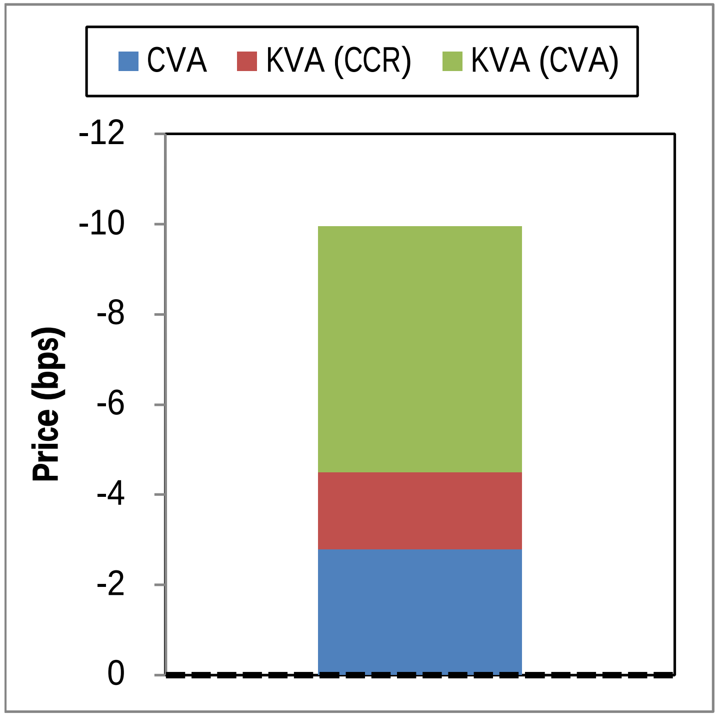
- **Bank can model the VAR with their own models with CVA defined by:**

$$CVA = LGD_{mkt} \sum_{i=1}^{T} max\left(0; exp\left(-\frac{s_{i-1}t_{i-1}}{LGD_{mkt}}\right) - exp\left(-\frac{s_i t_i}{LGD_{mkt}}\right)\right) \overbrace{\left(\frac{EE_{i-1}B_{i-1} + EE_i B_i}{2}\right)}^{\text{Fixed}}$$

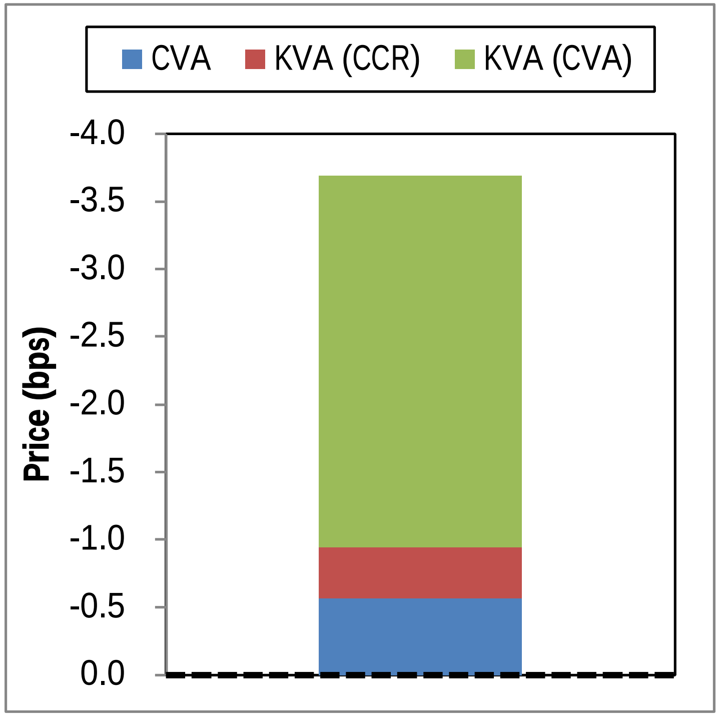
Loss given default | Spread for time point | EE (from IMM model) | Discount factor

- **This can be seen as an application of traditional VAR to CVA**
  - 10-day period, 99% confidence level, usual VAR multiplier of 3
  - Capital defined as **sum** of normal and stressed (wrt credit spreads) calculations
- **But traditional VAR is changing under FRTB?**

# The Impact of CVA Capital on Pricing




*Uncollateralised*
*7-year swap*
*Single-A counterparty*




*Uncollateralised*
*7-year swap*
*Triple-A counterparty*

*Counterparty risk capital requirements*

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## CVA and Accounting Rules

- **The CVA capital charge is not fully consistent with accounting requirements (e.g. IFRS 13)**
- **CVA calculation**
  - Accounting CVA will be driven by the internal model of a bank
  - Many banks do not have IMM approval and must use a more prescriptive method for capital calculations
  - Even IMM banks face differences between their CVA valuation methodology and their IMM approved approach (e.g. historical calibrations, requirement to use stressed data)
- **DVA**
  - Required under IFRS 13
  - Must be fully deducted under Basel III

# How Effective is CDS Hedging?

- **Bank of England Q2 2010**
  - *"… given the relative illiquidity of sovereign CDS markets a sharp increase in demand from active investors can bid up the cost of sovereign CDS protection. **CVA desks have come to account for a large proportion of trading in the sovereign CDS market** and their hedging activity has reportedly been a factor pushing prices away from levels solely reflecting the underlying probability of sovereign default."*
  - This leads to the "doom loop" although this is not supported by the IMF study (April 2013)
  - Has led to the CVA capital exemptions granted in Europe for Sovereigns and non-financials
- **Kenyon and Green (2013)**
  - Capital relief could easily account for 50% of CDS spread
  - This in turn would increase CVA capital!

## The EU Exemptions

- **Factors such as the doom loop led to EU exemptions for CVA capital charge under CRD IV**
  - Corporates, sovereigns
  - Pension funds (temporary)
- **These exemptions were significant**
  - For example, HSBC reported a drop in RWAs of $22 billion as a result of this
- **It seems likely that these exemptions will be reversed at some point**
  - For example "Overall, the EBA is of the opinion that EU exemptions on the application of CVA charges should be reconsidered or removed, since they leave potential risks uncaptured"

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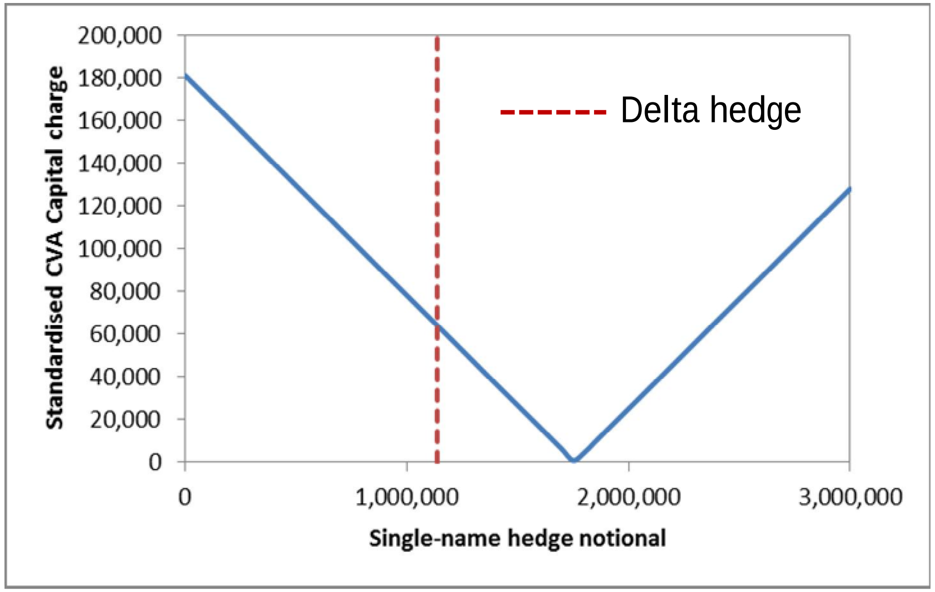
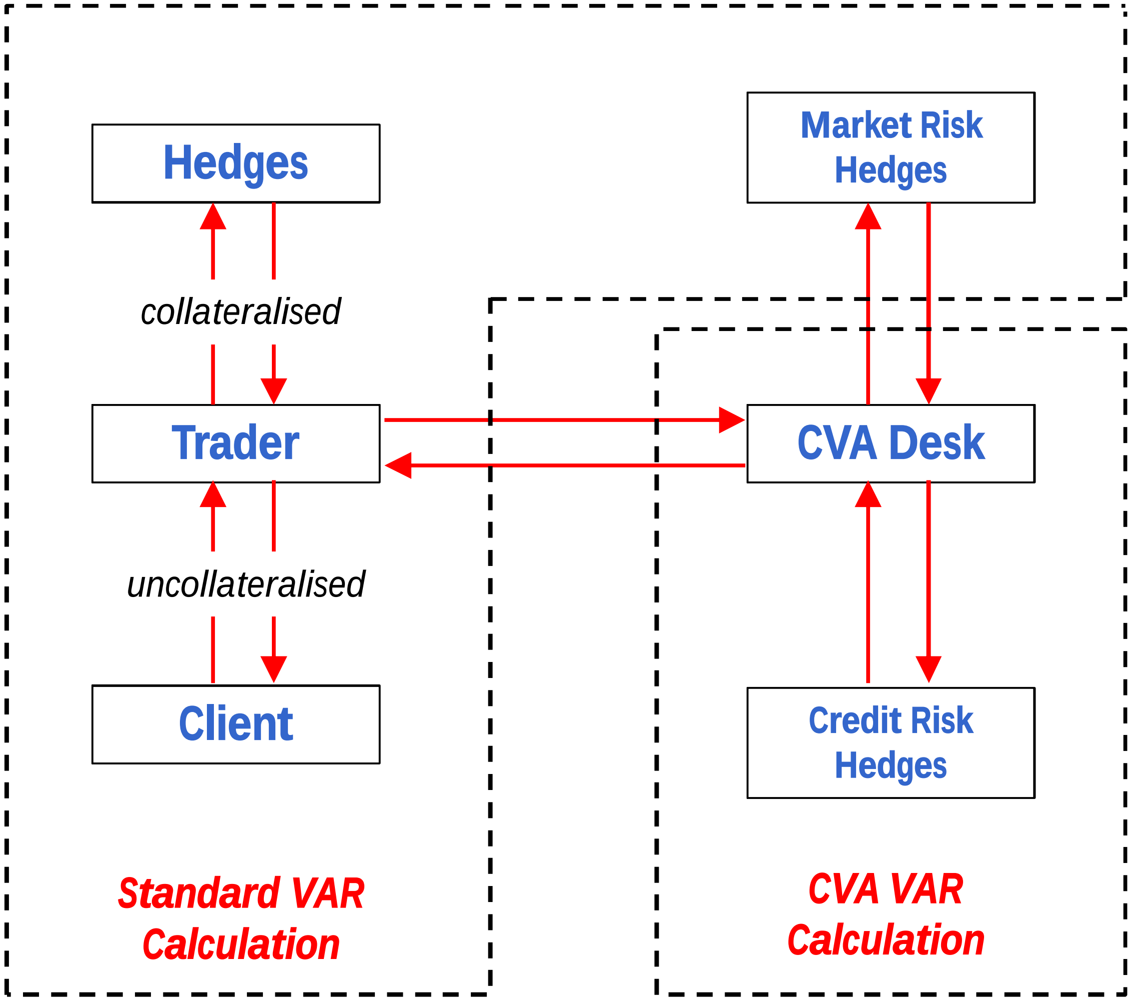
# Impact of Credit Hedges on Capital

| | CCR capital | CVA capital |
|---|---|---|
| **Single-name CDS** | Substitution / Double default | Partial relief according to formula |
| **Index CDS** | No relief (except wrt to name in the index) | Partial relief according to 50% correlation |
| **Proxy single-name CDS** | No relief | |
| **Other** | | |



# Impact of Hedging on CVA Capital




- **US and Canada**
  - Market risk CVA hedges not included in the market risk capital rules
  - No split hedge issue

## Mis-Alignment of CVA - Example

*The second quarter 2013 net revenues were €3.7 billion, versus €3.4 billion in the second quarter 2012, and included a loss of €58 million related to the impact of a Debt Valuation Adjustment (DVA) on certain derivative liabilities,* ***and a loss of € 69 million related to the mitigation of pro forma CRR/CRD 4 RWA on Credit Valuation Adjustment (CVA)***

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## Problems with the CVA Capital Charge

**1. Definition of CVA is not consistent with the accounting definition of CVA**

- This is less problematic for IMM banks but even then aspects such as stressed data and risk-neutral calibrations can be problematic

**2. Only credit spread volatility is considered**

**3. CVA capital must be computed separately from traditional market risk capital**

**4. The treatment of hedges is imperfect**

- Market risk hedges actually increase capital (due to points 2 and 3 above)
- Single-name proxy hedges are not allowed and will also increase capital
- Credit risk hedges may be "misaligned" (due to point 1 above)
- This could be made worse with the introduction of the SA-CCR in 2017

**5. Due to FRTB, the CVA capital methodologies would be even less aligned to those for traditional market risk**

## Rationale for the New Proposals

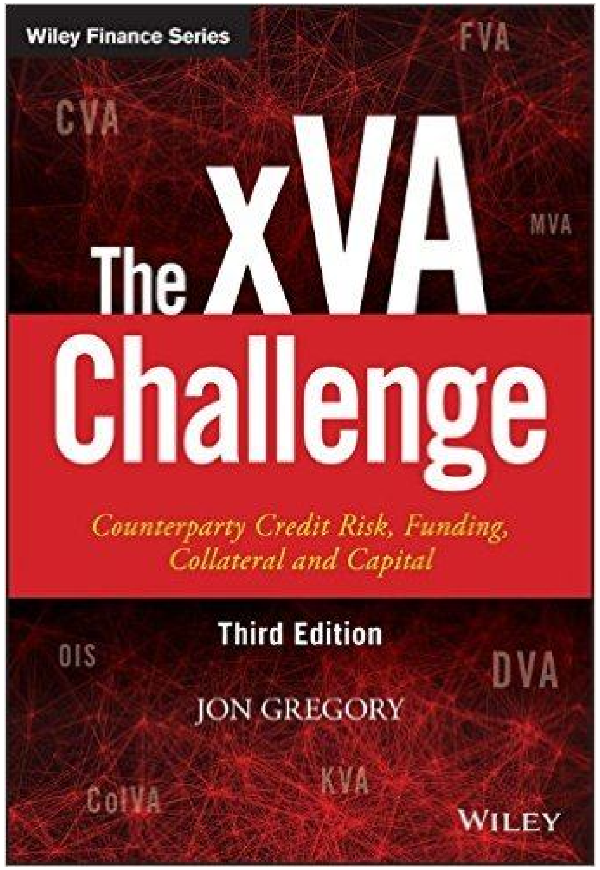
- **BCBS "Review of the Credit Valuation Adjustment Risk Framework", July 2015**
- **Capturing all CVA risks and better recognition of CVA hedges**
  - In particular, including the exposure component of CVA (e.g. interest rate, FX risk)
- **Alignment with industry practices for accounting purposes (but not DVA)**
  - Accounting approaches for CVA have become broadly aligned with respect to aspect such as the use of risk-neutral default probabilities
- **Alignment with proposed revisions to the market risk framework**
  - Adapt FRTB for market risk in the trading book to cover CVA and related hedges
- **However .....**
  - CVA risk is by nature more complex in nature than market risk on the trading book leading to different frameworks and choices about precise implementation
  - The FRTB-CVA calculation will still be on a stand-alone basis and non-eligible CVA hedges will remain in the trading book

## BCBS Proposals – FRTB-CVA Framework

- **Requirements:**
  - Bank can compute CVA sensitivities to a sufficiently large range of risk factors
  - Bank has a methodology for generating credit spreads for illiquid counterparties
  - Bank has a dedicated CVA risk management desk (CVA desk)
  - Otherwise a simpler "Basic CVA framework" must be used
- **Further split into IMA-CVA and SA-CVA depending on bank's ability to perform P&L attribution and backtesting**
  - Question of whether the accounting CVA or IMM CVA (for banks with approval) is used
- **Treatment of hedges**
  - Single-name and index CDS (as in current rules)
  - Proxy single-name CDS (basis risk must be captured)
  - Market risk hedges (where the purpose of the transaction is to hedge market risk and is booked by the CVA desk)
  - Some hedges are still not allowed (e.g. tranched or basket CDS)

## Summary

- **Capitalising CVA risk is much more complex that traditional market risk**
  - Banks may struggle to calculate the full range of CVA sensitivities
  - Hedges are more complex to treat (e.g. index CDS and proxy CDS)
- **The current CVA capital rules are problematic for a number of reasons**
  - CVA definition differs from accounting CVA
  - Bank's without IMM approval suffer from simplistic treatment
  - Only credit spread risk is capitalised
  - Treatment of some hedges is inappropriate
- **The new proposed rules aim to resolve the above issues and treatment CVA capital within a FRTB approach**
  - Likely to focus banks on calculation of CVA sensitivities and related aspects and less so on risk methodology implementation and IMM approval
  - May also lead to great procyclicality in the CVA capital charge

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