CVA Risk Framework
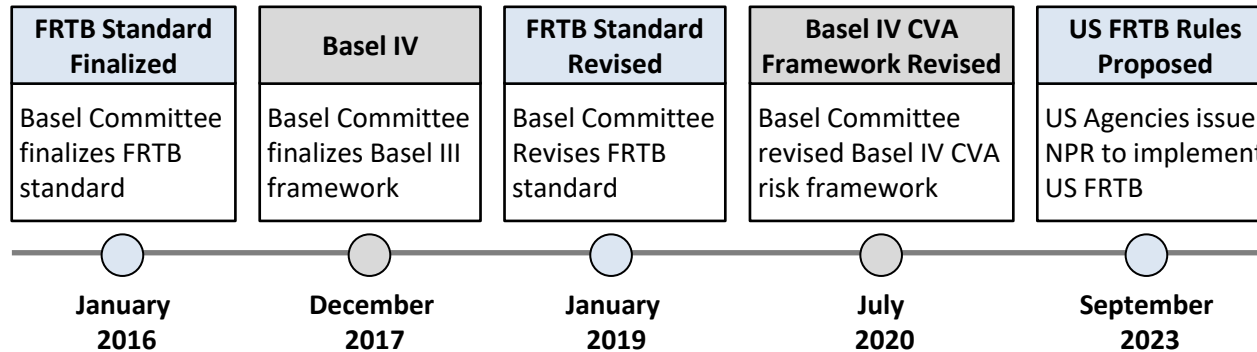## Regulatory Background and Calculation Steps

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Purpose

Basel IV's CVA risk standardised approach (SA-CVA) is an adaptation of the standardized approach sensitivity-based method for market risk (FTRB-SBM). This paper will focus on the Basel Committee's July 2020 SA-CVA risk framework and the US FRTB-SBM market risk capital requirements proposed in the NPR, and cover the following:

1. Provide background on the history and timelines of the Basel Committee standards for CVA risk and US market risk capital rules;
2. Summarize the key differences between the US FRTB NPR's Sensitivity-based method vs Basel IV Standardised Approach.

Regulatory Background

Basel Committee has intentionally aligned relevant parts of the CVA risk standardized approach framework to the final market risk sensitivities-based standard. In the Proposed US FRTB Rule, the Agencies would also largely align the U.S. market risk capital rule with the Basel Committee's 2019 FRTB standard. The following are the timelines of these standards:

FRTB Standard Finalized	Basel IV	FRTB Standard Revised	Basel IV CVA Framework Revised	US FRTB Rules Proposed
Basel Committee finalizes FRTB standard	Basel Committee finalizes Basel III framework	Basel Committee Revises FRTB standard	Basel Committee revised Basel IV CVA risk framework	US Agencies issue NPR to implement US FRTB
January 2016	December 2017	January 2019	July 2020	September 2023

Comparison of the Calculation Steps of US FRTB's Sensitivity-Based Method (SBM) vs Basel IV Standardised Approach

To determine the sensitivities-based capital requirement, banks would perform the following steps under both methods:

1. Assign each risk position to one or more risk buckets within the appropriate risk classes; *(applies to both)*
2. Map the risk positions to the appropriate risk factors within the risk bucket; *(applies to both)*
3. For each risk position, calculate the sensitivities of the position to each of the risk factors applicable to the position; *(applies to both)*
4. Apply the risk weights by multiplying the net sensitivities to each risk factor within the risk bucket by the risk weight; *(applies to both)*
5. Apply the aggregation formulas both within the same risk bucket and across rick buckets for calculating total delta, vega and in the case of FRTB-SBM curvature capital requirements. US FRTB-SBM requires banks to calculate three prescribed correlation scenarios (medium, low and high correlation), whereas SA-CVA uses standardised correlation parameter values;
6. For US FRTB-SBM, the final sensitivities-based capital requirement would be the largest capital requirement resulting from the three correlation scenarios. *(applies only to US FRTB-SBM)*

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	US FRTB NPR's Standardized Approach	Basel IV's CVA Risk Standardised Approach
Regulatory Approval	Banks **do not need** supervisory approval to use the standardized approach.	Banks **need** supervisory approval to use the SA-CVA method. For a bank to be considered eligible for the use of SA-CVA by its relevant supervisor the bank must meet the following criteria: 1) A bank must be able to model exposure and calculate, on at least a monthly basis, CVA and CVA sensitivities to the market risk factors; 2) A bank must have a CVA desk responsible for risk management and hedging of CVA.
Frequency of Calculation	Banks would be required to calculate the standardized measure for market risk at least **weekly**.	A bank must be able to model exposure and calculate, on at least a **monthly** basis, CVA and CVA sensitivities to the market risk factors.
Components	The proposed standardized measure for market risk would consist of 3 main components: a sensitivities-based capital requirement, a standardized default risk capital requirement, and a residual risk add-on. It would also include three additional components that would apply in limited instances to specific positions: **Standardized Approach** + **Additional Components** Sensitivities-Based Method Delta + Vega + Curvature + Standardized Default Risk + Residual Risk Add-On Fallback Capital Requirement + Capital Add-On for Resignations + Additional capital requirement established by the primary Federal Supervisor	The SA-CVA capital requirements are calculated as the sum of the capital requirements for delta and vega risks calculated for the entire CVA portfolio (including eligible hedges). This approach does **not include curvature risk, default risk, the residual risk add-on, as well as the three additional components** that would apply in limited instances to specific positions in the standardized measure for market risk: Standardised Approach Delta + Vega

CVA Risk Framework
Differences Between SA-CVA and US FRTB-SBM (2/4)

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	US FRTB NPR's Standardized Approach	Basel IV's CVA Risk Standardised Approach
Risk Classes of Sensitivities-Based Method	The capital requirements for delta, vega, and curvature risk are calculated as the sum if capital requirements across **seven risk classes**: 1. Interest rate risk 2. **Credit spread risk – non-securitization positions** 3. **Credit spread risk – correlation trading positions** 4. **Credit spread risk – securitization positions that are not correlation trading positions** 5. Equity risk 6. Commodity risk 7. FX risk	The capital requirements for delta risk are calculated as the sum of capital requirements across **six risk classes**. Capital requirements for vega risk use all of the same risk classes except for counterparty credit spread risk, so **five risk classes**: 1. Interest rate risk 2. **Counterparty credit spread risk** 3. **Reference credit spread risk** (ie credit spreads that drive the CVA exposure component) 4. Equity risk 5. Commodity risk 6. FX risk
Within Bucket Aggregation	This formula differs from the formula in Basel IV due to (1) flooring the quantity within the square root function at zero, and (2) omission of the additional term under the square root in Basel IV: $$K_b = \sqrt{\max\left(0, \sum_k WS_k^2 + \sum_k \sum_{k \neq l} \rho_{kl} WS_k WS_l\right)}$$	The formula differs from the formula in the sensitivities-based method for market risk by the presence of an additional term under the square root, proportional to the **hedging disallowance parameter R**, set at 0.1: $$K_b = \sqrt{\left(\sum_{k \in b} WS_k^2 + \sum_{k \in b} \sum_{l \in b, l \neq k} \rho_{kl} WS_k WS_l\right) + R \cdot \sum_{k \in b}\left(\left(WS_k^{Hdg}\right)^2\right)}$$
Across Bucket Aggregation	The formula does not include the multiplier m_{CVA} that is included in the SA-CVA approach, and there is no reference to a bank's relevant supervisor requiring a bank to use a higher value of m_{CVA} if if the supervisor determines that the bank's CVA model risk warrants it: $$K = \sqrt{\sum_b K_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} S_b S_c}$$	The formula differs from the aggregation formula in the market risk capital requirements by including the multiplier m_{CVA}. While the multiplier m_{CVA} was reduced from 1.25 to 1 in the July 2020 update, a bank's relevant supervisor may require a bank to use a higher value of m_{CVA} if the supervisor determines that the bank's CVA model risk warrants it: $$K = m_{CVA}\sqrt{\sum_b K_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} S_b S_c}$$

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Differences Between SA-CVA and US FRTB-SBM (3/4)

	US FRTB NPR's Standardized Approach	Basel IV's CVA Risk Standardised Approach
Use of External Ratings for Credit Spread Risk Weights	The risk weights for credit spread risk depend on the credit quality of the position. The use of external credit ratings from credit ratings agencies would be prohibited as Section 939A of the Dodd-Frank Act required the agencies to remove references to credit ratings in Federal regulations. Instead, the Agencies are proposing to use the existing definition for Investment Grade and newly proposed definitions for Speculative Grade, and Sub-speculative Grade.	Credit quality is specified as either investment grade (IG), high yield (HY), or not rated (NR). These credit ratings are to come from external ratings of credit rating agencies (e.g., S&P, Moody's, DBRS, Fitch).
Hedging Instrument Eligibility	Positions recognized as eligible external CVA hedges under the standardized capital requirements for CVA risk would be excluded from the market risk capital requirements under FRTB-SBM. Also, if a bank enters into one or more external hedges that hedge CVA variability but do not qualify as eligible hedges the bank would need to capture such hedges in its market risk capital requirements and would not be able to recognize the benefit of the external hedge when calculating risk-based capital requirements for CVA risk.	Differences in the CVA hedging instrument eligibility, as described in US FRTB NPR's Standardized Approach section. In addition, there are mapping differences to map instruments to risk classes. If an instrument is deemed as an eligible hedge for credit spread delta risk, it must be assigned in its entirety either to the counterparty credit spread or to the reference credit spread risk class.
Risk Weights	As there are differences in the risk bucketing for interest rate and credit risk classes (as described in next slide) between SA-CVA and US FRTB-SBM the risk weights will also differ with the granularity differences. In addition, for FX the SA-CVA uses a risk weight of 11% vs 15% in US FRTB-SBM to each currency pair. Lastly, for commodity risk class SA-CVA uses separate risk weights for electricity and gaseous combustibles whereas US FRTB-SBM would apply the same risk weight to gaseous combustibles and electricity to allow for greater recognition of hedges between these two commodities.	Differences in the risk weights, as described in US FRTB NPR's Standardized Approach section.

Differences Between SA-CVA and US FRTB-SBM (4/4)

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*A key difference between SA-CVA and US FRTB-SBM is that SA-CVA features a reduced granularity of market risk factors from the standardized approach for market risk. The risk classes, risk buckets, and dimensions are generally consistent between approaches. The following table notes the similarities and differences of the **delta risk buckets and risk weights**:*

Risk Type	US FRTB NPR's Standardized Approach	Basel IV's CVA Risk Standardised Approach
Interest Rate	• Risk Buckets: Each currency; • Risk weights are applied across **10 different tenors** + inflation risk factor + **cross-currency basis risk factor**.	• Risk Buckets: Each currency; • Risk weights are applied across **5 different tenors** + inflation risk factor.
Credit	**Credit Spread Risk (CSR): Non-Securitizations:** • **19 buckets** broken down by credit quality and sector; • Risk factors defined by tenors: 0.5Y, 1Y, 3Y, 5Y, 10Y. **CSR: Securitizations (Correlation Trading Portfolio):** • **17 buckets** broken down by credit quality and sector; • Risk factors defined by tenor of the underlying name: 0.5Y, 1Y, 3Y, 5Y, 10Y. **CSR: Securitizations (Non-Correlation Trading Portfolio):** • **25 buckets** broken down by credit quality and sector; • Risk factors defined by tenor of the tranche: 0.5Y, 1Y, 3Y, 5Y, 10Y.	**Counterparty Credit Spread Risk:** • **8 buckets** broken down by industry sector; • Risk factors defined as the credit spreads of tenors: 0.5Y, 1Y, 3Y, 5Y, 10Y. **Reference Credit Spread Risk:** • **17 buckets** broken down by credit quality and sector; • Risk factors defined as the credit spreads of all tenors for all reference names in the bucket.
Equity	• 13 buckets, by market capitalization, economy and sector; • Risk factors defined as the spot equity price by issuer and equity repo rate by issuer.	• 13 buckets, market capitalization, economy and sector; • Risk factors defined as the spot equity price by issuer.
Commodity	• 11 buckets broken down by commodity type; • Risk factors defined for each commodity type by contracted delivery location & remaining maturity of contract.	• 11 buckets broken down by commodity type; • Risk factors defined as the commodity spot price for all commodities in the bucket.
FX	• An FX risk bucket is set for each exchange rate between the currency in which an instrument is denominated and the reporting currency.	

CVA Risk Framework
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