

# Basel IV Readiness





The Basel Committee for Banking Supervision (BCBS) proposed finalization of Basel III encompasses so many changes that the industry started referring to it as Basel IV. Basel IV changes the calculation of risk-weighted assets (RWA) which will have a significant impact on business models and forces banks to rethink their capital allocation strategies.

BCBS published its final documents on the reform of Basel III in December 2017, which are now commonly referred to as "Basel IV." In the interim, implementation of Basel IV has been deferred to January 2023, and the US Federal Reserve has yet to publish their final ruling. However, understanding the potential impacts of Basel IV now is key, and will give firms a head start in implementation efforts once the final ruling is published.

How can you manage the uncertainty?  
PwC can help.

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# Key changes to Basel III and considerations for Basel IV



## Credit Risk-SA Credit Risk - Standardized Approach



## Credit Risk-IRB Credit Risk - Internal Ratings Based Approach



## SA-CCR Standardized Approach - Counterparty Credit Risk



## FRTB/CVA Fundamental Review of the Trading Book / Credit Valuation Adjustment



## Operational Risk

### Key changes to Basel III

- Introduces due diligence requirements for certain types of counterparties
- Adds more granular counterparty types (e.g. specialized lending), with distinct risk-weighting rules
- Increases requirements for meeting certain treatments (e.g. real estate secured)
- Segregates real estate exposure risk weights based on Loan-To-Value (LTV)

- Introduces restrictions on which type of counterparties the IRB Approach may be used
- Applies floors to Probability of Default (PD), Loss Given Default (LGD) and Credit Conversion Factor (CCF) to the portfolios that remain eligible for the use of the advanced approach

- Replaces the Current Exposure Method (CEM)
- Introduces hedging sets for specific asset classes
- Provides better recognition of secured and cleared trades
- Introduces increased risk sensitivity by addressing over-collateralisation and negative market values

- Introduces risk sensitivity-based Standardized Approach (SA) calculations for market risk capital floor
- Internal Model Approach (IMA) requires enhanced considerations
- CVA Internal Model Method (IMM) will not be allowed
- Introduces product-based banking boundary versus trading book

- Introduces a new SA to replace the Advanced Measurement Approach (AMA) for calculating operational risk capital requirements
- Calculates capital requirements using financial statement-based proxies and an Internal Loss Multiplier (scaling factor based on average historical losses)

### Key considerations for Basel IV

- Credit card impact will be driven by customer behavior
- Real Estate exposure may receive relief
- Corporate impact will be driven by counterparty type
- New exposure classes require system changes
- Impact will vary based upon business model

- Uncertain if US regulators will allow F-IRB approach
- IRB approach may become the RWA floor
- A reduced scope in IRB may lead to higher RWA

- Increased data granularity results in more precise calculations
- Optimization focuses on net exposure rather than gross notional reduction
- Allocation of netting set level Exposure At Default (EAD) to trades and "what-if" analysis can improve capital management

- Infrastructure and growth plans dictate IMA versus SA election
- Systems/operational overhaul may be more optimal
- IMA risk factor governance is a significant hurdle
- CVA-SA suited for sophisticated CVA models and hedging
- Reoptimization of banking vs trading designation

- Amplification of operational Risk losses
- Keeping up with operational loss data requirements
- System enhancements to capture and log operational events



# Credit Risk- Standardized Approach



# Key considerations when implementing Credit Risk-SA



Credit card impact will be driven by customer behavior

The CCF for unused consumer credit balances will increase from 0% to 10%.

Credit limit increases and customer spend behavior (e.g., "transactor" vs "revolving") will directly impact capital requirements.

The ability to forecast expectations on both of these aspects should be a part of capital planning.



Real Estate exposure may receive relief

Introduction of risk weights scaled based on LTV band for commercial and residential real estate mortgages will likely provide a significant RWA benefit for banks' real estate portfolios with lower LTVs.



Corporate impact will be driven by counterparty type

A reduced risk weight is proposed for Investment Grade (IG) corporate exposures with public securities (100% to 65%) and for Small and Medium Sized (SME) (100% to 75% or 85%) enterprises.



New exposure classes require system changes

New exposures classes to the US SA for Credit Risk introduced, including retail, specialized lending and commercial real estate.

New exposure classes require banks to update their exposure classification systems, processes and data.



Impact will vary based upon business model

Meaningful insights require more granular impact analysis to identify business impacts, refine capabilities, and identify opportunities and challenges.

# Overcoming Credit Risk-SA implementation challenges

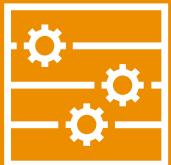


## Common issues achieving Credit Risk-SA requirements

- Certain exposure classes see **significant changes in RWA** (e.g. Credit cards). There will be significant impacts on the banks' business models
- Historically, the **US regulators have deviated from BCBS proposed rules**. Determining the full impact to your business model requires more certainty from regulators.



## Business model impact



## Technology and operational processes



## Interaction with other rules and Capital Planning



## Approach to addressing these issues

- Start with **regular impact assessments with a range of outcomes**. Meaningful insights require more granular impact analysis to identify business impacts, refine capabilities, and identify opportunities and challenges
- Implementation of the known and stable elements of the proposed rules offers earlier **insight into your capabilities and accelerates identification** of where your system and data infrastructure may be lacking and **start building flexible capabilities** which allow for implementation of different outcomes

- Start collecting **essential data elements** for areas where the most relief can be achieved (e.g. 12 month repayment data for credit cards)
- The **rules incentivize having the required data elements**, investing in a proper data infrastructure may be worth it
- System enhancements, business rule changes and data requirements associated with Basel IV implementation should be **coordinated with other critical in-flight programs** enhancing data, infrastructure and regulatory reporting capabilities

- **Business engagement and ownership** in the implementation process is essential for effective capital planning and development of mitigation strategies
- **Centralized and comprehensive impact studies** allow for a thousand foot view on impact to the combined impact of the changes



# Credit Risk-SA - US Basel III versus Basel IV - summary of differences

## Exposure Class

Sovereigns and Related Entities

Banks and Financial Institutions

Residential Real Estate

Commercial Real Estate **(NEW)**

Retail Exposures **(NEW)**

Corporates

Off Balance Sheet Exposures

Specialized Lending **(NEW)**

Subordinated Debt and Equity

Other

	BASEL III	BASEL IV
Sovereigns and Related Entities	<ul style="list-style-type: none"> <li>US government: 0%</li> <li>Foreign governments: Based on OECD CRC 0%-150% RW</li> <li>MDB: 0% RW for exposures to certain MDBs and supranational organisations</li> <li>GSEs: 20% RW for exposures to GSE' and 100% RW for preferred stock issued by a GSE</li> <li>US Banks: 20%</li> <li>Foreign banks: Based on CRC 20%-150% RW</li> <li>Financial Institutions as corporates, so 100% RW</li> </ul>	<ul style="list-style-type: none"> <li>In jurisdictions where external ratings are not allowed, MDB's are assigned a 50% RW</li> <li>No other changes</li> </ul>
Banks and Financial Institutions	<ul style="list-style-type: none"> <li>RW of 50% if certain certain requirements are met</li> <li>RW of 100% if those requirements are not met and to junior liens</li> <li>RW of 50% for statutory multifamily mortgages</li> <li>RW of 50% for Pre-sold construction loans, 100% if the purchase contract is cancelled</li> </ul>	<ul style="list-style-type: none"> <li>RWs based on risk weight buckets, depending on certain criteria:             <ul style="list-style-type: none"> <li>Long Term: 30%(Grade A+), 40%(Grade A), 75%(Grade B), 150%(Grade C)</li> <li>Long Term: 20%(Grade A+), 20%(Grade A), 50%(Grade B), 150%(Grade C)</li> </ul> </li> <li>Certain Financial Institutions which are equivalently supervised may be treated as banks, otherwise 100%</li> </ul>
Residential Real Estate	<ul style="list-style-type: none"> <li>RW of 150% for high-volatility commercial real estate</li> <li>RW of 100% tol corporate exposures</li> <li>RW of 50% for Pre-sold construction loans</li> <li>No separate exposure class for Retail exposures, therefore 100% RW</li> </ul>	<p><b>General Treatment:</b> • RW based on LTV: RW from 20% (<math>LTV \leq 50\%</math>) to 70% (<math>LTV \geq 100\%</math>)  <b>Income Producing PRE:</b> • RW based on LTV (30% to 105%)  <b>LADC:</b> • <math>W = 150\%</math></p>
Commercial Real Estate <b>(NEW)</b>	<ul style="list-style-type: none"> <li>All corporate exposures: 100%</li> </ul>	<p><b>General Treatment:</b> • RW based on LTV: RW 60% If <math>LTV \leq 60\%</math>, if <math>LTV \geq 60\%</math>, RW of counterparty  <b>Income Producing CRE:</b> • RW based on LTV (70% to 110%)  <b>LADC:</b> • <math>W = 150\%</math></p>
Retail Exposures <b>(NEW)</b>	<ul style="list-style-type: none"> <li>CCF for unconditionally cancellable commitments increases from 0% to 10%</li> <li>CCF for Unused commitments with a maturity &lt; 1 year will increase from 20% to 40%</li> <li>CCF for Unused commitments with a maturity &gt; 1 year will decrease from 50% to 40</li> <li>No changes to other off balance sheet commitments</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory retail: RW = 75%</li> <li>Transactors (specific credit and charge cards): RW = 45%</li> <li>Other retail: RW = 100%</li> <li>Investment grade: RW = 65%</li> <li>SME: RW = 85% or 75%</li> <li>Other corporates: RW = 100%</li> </ul>
Corporates	<p>No separate exposure class for Specialized Lending, therefore treatment based on the counterparty type, but generally a 100% RW for corporate exposures</p>	<ul style="list-style-type: none"> <li>Object / commodity finance: RW = 100%</li> <li>Pre-operational project finance: RW = 130%</li> <li>Operational project finance: RW = 100% (80% if high quality)</li> </ul>
Off Balance Sheet Exposures	<ul style="list-style-type: none"> <li>Sovereign and related equity: 0%</li> <li>PSE: 20%</li> <li>Community Development Investment (CDI) and non-significant investments: 100%</li> <li>Significant investments in unconsolidated entities: 250%</li> <li>Publicly traded equity: 300%</li> <li>Non-publicly traded equity: 400%</li> <li>Certain investment firms qualifying as traditional securitization: 600%</li> </ul>	<ul style="list-style-type: none"> <li>Subordinated debt incl. other TLAC liabilities: RW = 150%</li> <li>Speculative unlisted equity exposures: RW = 400%</li> <li>All other equity: RW = 250%</li> </ul>
Specialized Lending <b>(NEW)</b>	<ul style="list-style-type: none"> <li>Introduction of a 1.5 multiplier in case of currency mismatch between exposure and income currency</li> <li>Several detailed changes to credit risk mitigation techniques, e.g. changes to financial collateral haircuts</li> </ul>	
Subordinated Debt and Equity		
Other		



# Potential material impacts of Credit Risk-SA

	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
Real Estate Exposures	↘	<ul style="list-style-type: none"> <li>Introduction of risk weights scaled based on LTV band for both residential and commercial mortgages</li> </ul>	<ul style="list-style-type: none"> <li>Resi mortgage with 80% LTV proposed to receive a Risk Weight (RW) of 40%, down from 50% and can fall to 20% if LTV &gt; 50%</li> <li>CRE with LTV <math>\leq</math> 60% to decrease from 100% to 60%</li> </ul>
Corporate Exposures	↘	<ul style="list-style-type: none"> <li>Introduction of reduced risk weight for investment grade corporate exposures with public securities on an exchange. Investment grade cannot reference external credit ratings and will need to be defined based the borrower's risk profile.</li> </ul>	<ul style="list-style-type: none"> <li>Investment grade corporate (including insurance companies) exposures meeting the new definition, which could be principles-based or prescribed by quantitative criteria, can be risk weighted at 65% instead of 100%</li> </ul>
Retail Exposures	↘	<ul style="list-style-type: none"> <li>Introduction of the retail exposure class in the SA will reduce risk weights for retail and credit card balances</li> </ul>	<ul style="list-style-type: none"> <li>Certain retail products &lt;\$1M and not material to the portfolio will be assigned a 75% RW instead of 100%</li> <li>Balances for customers that repaid their credit balance in full every month over the past 12 months are assigned 45% instead of 100%</li> </ul>
Unused Commitments	↗	<ul style="list-style-type: none"> <li>The Credit Conversion Factors for certain off balance sheet commitments are adjusted, generally up</li> </ul>	<ul style="list-style-type: none"> <li>The CCF for Unused Credit Card lines of credit will increase from 0% to 10%, and unused commitments with a maturity &lt; 1 year will increase from 20% to 40%</li> </ul>
Banks	↗	<ul style="list-style-type: none"> <li>RW for long-term bank exposures will increase since Basel IV introduces four grades of RW% (30%, 40%, 75% and 150%) based on counterparty's compliance with certain regulatory requirements and the bank's CET 1 Ratio and Leverage Ratio</li> </ul>	<ul style="list-style-type: none"> <li>LT exposure to Bank A will increase from 20% to 40%</li> <li>LT exposure to Bank B will increase from 20% to 30% if CET 1 &gt;14% and Tier 1 Leverage Ratio &gt;5%</li> </ul>
Financial Collateral	↗	<ul style="list-style-type: none"> <li>Haircuts applied to non-sovereign financial collateral for credit risk mitigation increase in certain cases</li> </ul>	<ul style="list-style-type: none"> <li>The haircut for equities listed on a main index increases from 15% to 20% in Repo Style transactions</li> <li>A floor on haircuts for repo style transactions is introduced for transactions with non prudentially supervised counterparties</li> </ul>
Capital Floors	↘	<ul style="list-style-type: none"> <li>A capital floor as a percentage of the SA for Advanced Approach banks is introduced</li> </ul>	<ul style="list-style-type: none"> <li>The output floor will be phased-in between 2023 (50%) and 2028 (72.5%), meaning that for certain banks the Advanced Approach may become the higher capital requirement</li> </ul>

↗ Potential increase

… Uncertain

↘ Potential decrease

# Other impacts of Credit Risk-SA

Financial Institutions	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
Securitizations	...	<ul style="list-style-type: none"> <li>RWA for Certain financial institutions will decrease because they may now potentially be treated as bank exposures</li> </ul>	<ul style="list-style-type: none"> <li>Short term exposures to “grade A” Asset Managers will decrease from 100% to 20%</li> <li>Long Term exposures to “grade B” Asset Managers will decrease from 100% to 75%</li> </ul>
Project Financing	...	<ul style="list-style-type: none"> <li>Simple, Transparent and Comparable (STC) securitizations are introduced</li> <li>The RW% floor is decreased from 20% to 10% (STC) and 15% (Non-STC)</li> <li>Risk weights for credit card and RMBS securitizations will decrease based on the risk weights of the underlying securitized exposures</li> </ul>	<ul style="list-style-type: none"> <li>STC securitizations will see RWA go down due to lower floors</li> <li>Non-STC will see increased correlation parameter from 0.5 to 1, increasing the RWA in the Simplified Supervisory Formula Approach calculation</li> <li>Risk weights for securitizations are based on the risk weights of the underlying exposures, credit card and residential mortgage risk weights generally decrease</li> </ul>
Step-In Risk	↗	<ul style="list-style-type: none"> <li>Guidelines introduced for Step-In Risk management may increase capital requirements</li> </ul>	<ul style="list-style-type: none"> <li>BCBS introduced guidelines for Step-In Risk. It is up to local supervisors to decide if and how these guidelines should be implemented. Regulators could decide to include requirements for Step-In Risk as capital requirements in pillar I or as a requirement under SCB.</li> </ul>

↗ Potential increase

... Uncertain

↘ Potential decrease



# Credit Risk- Internal Ratings Based Approach



# Key considerations when implementing Credit Risk-IRB



## Uncertain if US regulators will allow Foundation IRB (F-IRB) approach

BCBS proposes to discontinue Advanced IRB (A-IRB) for Equities, Large Corporates and Banks.

US regulators never implemented F-IRB under Basel II, so there is significant uncertainty regarding implementation.



## IRB approach may become the RWA floor

Increase of PD and LGD floors and introduction of Supervisory-set LGD's, may result in higher RWA under the Advanced Approach.

Changes in PDs, LGDs resulting in higher RWA may result in the Advanced Approach becoming the RWA floor under the Collins Amendment, shifting capital planning and allocation practices.



## A reduced scope in IRB may lead to higher RWA

Basel IV narrows the applicability of the Advanced IRB approach for Equities, Large Corporates and Banks.

Using the F-IRB approach or SA generally leads to higher RWA.

# Overcoming Credit Risk-IRB impact implementation challenges

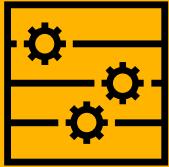


## Common issues achieving IRB requirements

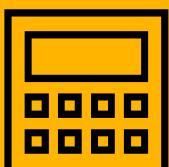
- Revised approach to capital allocation and optimization for portfolios for which IRB will still be eligible
- Allocation of capital may become a mix of the SA, F-IRB, A-IRB, CCAR and Economic Capital models
- Global banks will have to deal with local regulators implementing rules differently, making business model impact geographically specific



## Capital Allocation and Planning



## Technology and Operational processes



## Modeling Practices



## Approach to addressing these issues

- Start with **regular impact assessments**. Meaningful insights require more granular impact analysis to identify business impacts, refine capabilities, and identify opportunities and challenges.
- Assess per exposure class the **incremental effort and benefit** of using SA, A-IRB or F-IRB.
- Constraints to the use of IRB allows banks to apply IRB per exposure class. This allows for **optimization of exposures classes in effort and capital requirements**, within supervisory expectations.

- Implementation of the known and stable elements of the proposed rules offers earlier **insight into your capabilities and accelerates identification** of where your system and data infrastructure may be lacking.
- **Build infrastructure** components that allow for flexible implementation of new rules
- Establish roll-out plans for exposure classes where the approach changes and **assess the need for systems, processes, data and reporting requirements** going forward.

- **Assess current modeling practices** against updated parameter requirements for A-IRB and F-IRB to determine potential gaps.
- **Change models**, e.g. insured / guaranteed products might need to be out-sourced from LGD model development activities.

- Additional data requirements on collateral type for calibration of LGD for secured corporate and retail exposures
- Redundant historical databases and models used for parameters estimation of observations.
- Historically, the **US regulators have deviated from BCBS proposed rules**. Determining the full impact to your business model requires more certainty from regulators.

- Due to the greater specification in the rules about how to determine model parameters, **reassessment and recalibration of PD, LGD and EAD** may be needed.
- **Re-thinking of model structure** for segments with issues on collateral recovery data for LGD estimates based on a mix of own LGD – for unsecured part – and regulatory LGDs for the secured part of exposure.
- Under A-IRB, **guarantees and credit derivatives must apply method used to determine the RW %** for a direct exposure to the guarantor or protection seller.



# Changes related to the Credit Risk-IRB approach

CHANGES

- The Collins Amendment sets the Capital floor as the higher of the SA or the Advanced Approach
- Currently, the SA is generally the higher Capital Requirement, however, this may change under Basel IV
- Rationale for changes:
  - Reduction of complexity of the regulatory framework
  - Improve the comparability of models used by banks
  - Reduction of excessive variability in capital requirements for credit risk

## Reduced scope of internal models

Reduced scope of IRB approaches for asset classes

**The current US Basel III rule does not allow the use of the F-IRB approach for any exposure classes**

## Increased floors on model parameter

Increase of floors for PD/LGD/CCF (Current: 0.03% PD for Retail and 10% LGD for Residential Mortgages)

## Changes to the estimation of parameters and requirements

Several specifications on estimation practices and requirements around rating processes, governance of models, data and documentation standards

## DETAILS

Portfolio/Exposure	Basel II	Basel IV
Large and mid-sized corporates (consolidated revenues > € 500m)	A-IRB, F-IRB, SA	F-IRB, SA
Banks and other financial institutions	A-IRB, F-IRB, SA	F-IRB, SA
Equities	Various IRB approaches	SA
Specialized lending (new exposure class)	A-IRB, F-IRB, slotting, SA	A-IRB, F-IRB, slotting, SA
Retail	A-IRB, SA	A-IRB, SA
<ul style="list-style-type: none"> <li>• Corporates: PD 0.05%, LGD unsecured 25% and LGD secured 0%, 10% or 15% (depending on collateral type)</li> <li>• Retail: PD 0.05%, LGD unsecured 30% or 50% and LGD secured 0%, 5%, 10% or 15% (depending on collateral type)</li> <li>• EAD: Use CCF of F-IRB as benchmark</li> <li>• Removal of IRB scaling factor of 1.06</li> </ul>		
<ul style="list-style-type: none"> <li>• Greater specificity is provided for the practices that banks may use to estimate their model parameters (e.g. Every legal entity needs to be rated separately for wholesale exposures, minimum risk drivers for retail exposures)</li> <li>• Stability of ratings (Through-the-cycle)</li> <li>• PD estimation is based on historical average one year default rates</li> <li>• The use of internal models for the estimation of CCFs for non-revolving commitments is no longer allowed</li> </ul>		



### Consequence

Changes to the Advanced Approach for Credit Risk may be significant in certain cases, potentially making the Advanced Approach the new floor.



# Potential impacts of the Credit Risk-IRB approach

OTHER CHANGES WITH A POTENTIAL IMPACT	POTENTIAL MATERIAL IMPACT	Potential RWA impact	DESCRIPTION	ANALYSIS AND EXAMPLES
Increase of PD and LGD floors		↗	<ul style="list-style-type: none"> <li>Increase of PD and LGD floors will increase RWA across the board (except sovereign exposures)</li> </ul>	<ul style="list-style-type: none"> <li>Increase of floors for of PD ( 0.03% vs. 0.5%) and LGD (<math>\geq 5\%</math>, <math>\geq 10\%</math> or <math>\geq 15\%</math>, depending on collateral type) will lead to an increase of RWA for low-risk exposures</li> </ul>
Equity Exposures		↗	<ul style="list-style-type: none"> <li>Equity exposures are placed out of the IRB scope and hence only the SA can be used</li> </ul>	<ul style="list-style-type: none"> <li>Application of the SA for Equity exposures will increase RWA given the generally high RW% for equity exposures (<math>\geq 100\%</math>)</li> </ul>
Non-Revolving Undrawn Commitments		↗	<ul style="list-style-type: none"> <li>RWA for non-revolving undrawn commitments will generally go up due to the use of Standardized CCFs</li> </ul>	<ul style="list-style-type: none"> <li>Standardized CCF's are generally higher than internally modeled.</li> <li>Standardized CCF for non-revolving commitments will generally be at least 40% (except for trade letters of credit, these are assigned 20%)</li> </ul>
Reduced Scope A-IRB		↗	<ul style="list-style-type: none"> <li>Basel IV reduces the scope of application of the A-IRB approach for banks, other financial institutions and larger corporates</li> </ul>	<ul style="list-style-type: none"> <li>The RWA for these exposures should instead be determined using the F-IRB approach or using SA. Which generally leads to higher RWA due to less tailoring to the bank's specific environment and portfolios.</li> </ul>
Removal of Scaling Factor		↘	<ul style="list-style-type: none"> <li>The removal of the 1.06 scaling factor for Credit Risk RWA will offset some of the potential negative impacts to the IRB approach</li> </ul>	<ul style="list-style-type: none"> <li>Currently a 1.06 scaling factor is applied to Credit Risk RWA for retail, wholesale, securitization and equity exposures under the Advanced Approach. Basel IV proposes to remove this factor.</li> </ul>
Potential Introduction of F-IRB		● ● ●	<ul style="list-style-type: none"> <li>US regulators never implemented F-IRB under Basel II. There is uncertainty on how the regulator will deal with this.</li> </ul>	<ul style="list-style-type: none"> <li>If F-IRB is introduced, this will increase RWA for exposures on A-IRB</li> <li>Regulators could also require the use of SA instead of F-IRB for exposure classes where Basel wants to limit to use of models</li> </ul>
Capital Floor		↘	<ul style="list-style-type: none"> <li>A capital floor as a percentage of the SA for Advanced Approach banks is introduced</li> </ul>	<ul style="list-style-type: none"> <li>The output floor will be phased-in between 2023 (50%) and 2028 (72,5%), meaning that for certain banks the Advanced Approach may become the higher capital requirement</li> </ul>





# Bringing Standardized and Advanced Approaches together

Allowed Approaches	CHANGES TO STANDARDIZED APPROACH	CHANGES TO ADVANCED APPROACHES
Real Estate Exposures	<ul style="list-style-type: none"> <li>Standardized</li> <li>F-IRB (Corporate)</li> <li>A-IRB (Retail)</li> </ul>	<ul style="list-style-type: none"> <li>Introduction of risk weights scaled based on LTV band for both residential and commercial mortgages: e.g. Resi mortgage with 80% LTV proposed to receive a Risk Weight (RW) of 40%, down from 50% and can fall to 20% if LTV &gt; 50%</li> </ul>
Corporate Exposures	<ul style="list-style-type: none"> <li>Standardized</li> <li>F-IRB</li> </ul>	<ul style="list-style-type: none"> <li>Introduction of reduced risk weight (100% -&gt; 65%) for investment grade corporate exposures with public securities on an exchange. Investment grade cannot reference external credit ratings and will need to be defined based the borrower's risk profile.</li> </ul>
Retail Exposures	<ul style="list-style-type: none"> <li>Standardized</li> <li>A-IRB</li> </ul>	<ul style="list-style-type: none"> <li>Certain retail products &lt;\$1M and not material to the portfolio will be assigned a 75% RW instead of 100%</li> <li>Balances for customers that repaid their credit balance in full every month over the past 12 months are assigned 45% instead of 100%</li> </ul>
Unused Commitments	<ul style="list-style-type: none"> <li>Standardized</li> <li>F-IRB</li> <li>A-IRB</li> </ul>	<ul style="list-style-type: none"> <li>The CCF for Unused Credit Card lines of credit will increase from 0% to 10%, and unused commitments with a maturity &lt; 1 year will increase from 20% to 40%</li> </ul>
Banks	<ul style="list-style-type: none"> <li>Standardized</li> <li>F-IRB</li> </ul>	<ul style="list-style-type: none"> <li>RW for long-term bank exposures will increase since Basel IV introduces four grades of RW% (30%, 40%, 75% and 150%) based on counterparty's compliance with certain regulatory requirements and the bank's CET 1 Ratio and Leverage Ratio</li> </ul>
Equity Exposures	<ul style="list-style-type: none"> <li>Standardized</li> </ul>	<ul style="list-style-type: none"> <li>Limited changes</li> </ul>
Securitizations	<ul style="list-style-type: none"> <li>Supervisory Formula Approach (IRB)</li> <li>Simplified Supervisory Formula Approach (Standardized)</li> </ul>	<ul style="list-style-type: none"> <li>Simple, Transparent and Comparable (STC) securitizations are introduced, with different correlation factors</li> <li>The RW% floor is decreased from 20% to 10% (STC) and 15% (Non-STC)</li> </ul>



# Standardized Approach - Counterparty Credit Risk



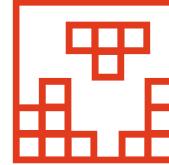
# Key considerations when implementing SA-CCR



## Increased data granularity results in more precise calculations

SA-CCR's EAD calculation is based on over 100 data elements that include trade, collateral, hedging set and counterparty information.

Robust data management practices for sourcing this granular data can improve the precision of the calculation and reduce exposure.



## Optimization focuses on net exposure rather than gross notional reduction

Netting of offsetting exposures will shift the focus of portfolio optimization from reducing gross notional exposures to reducing net exposure.

Netting of offsetting exposures may change the relative costs of some products, e.g., reducing the exposure from interest rate swaps but increasing the exposure from foreign exchange products.



## Revised netting set and “what-if” analysis improves capital management

Netting of offsetting transactions makes it no longer possible to see the capital charge associated with each trade.

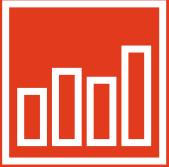
Development of an allocation methodology and the ability to run “what-if” analysis can help to understand the capital charge of a trade before it is booked.

# Overcoming SA-CCR implementation challenges



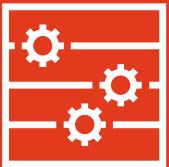
## Common issues achieving SA-CCR requirements

- **Increased complexity** with multiple data sources
- **Lack of standard nomenclature** of derivative and long dated settlement product types to map to SA-CCR requirements
- **Data redundancy** within risk systems
- **Linkage of transaction data to client reference data** such as netting, collateral, margin information, etc.
- **Decomposition of complex products** such as digital options



## Data requirements

- **Inconsistent and redundant data** infrastructure and lack of data lineage across market risk, credit risk, business unit risk and profit / loss controller groups.
- Organize and streamline **data storage and pipelines** in order to accommodate increased data volume demands
- **Ineffective document governance** leads to increased time in locating correct version of data transformation documentation



## Technology and Operational processes

- **Lack of end-to-end testing plan** buildout for User Acceptance Testing of all product type from each data source
- **Increased complexity** with calculation of EAD for complex products at an aggregated and disaggregated level
- **Lack of an effective challenger calculator** to validate test results from the SA-CCR calculator



## Calculator Documentation and validation



## Approach to addressing these issues

- **Enhance and streamline data governance** across front-office and risk systems
- Create a **standardized nomenclature** across all derivative and long dated settlement products to facilitate integration with the rest of the ecosystem
- **Normalize database** layers to remove data redundancy and develop a data lineage document to identify single source of truth for a data element

- **Build a SA-CCR data interface layer** with a standardized list of data elements for standard derivative and long dated settlement product types from all data sources
- **Assess and develop a plan** to procure additional computing resources to manage the data volume demands
- Implement **development framework** to accelerate release process

- Develop an **end-to-end testing plan** for all product types from each data source
- Leverage a third party Challenger SA-CCR calculator to **validate test results** from the SA-CCR calculator

# Overview of the SA-CCR framework

## Objectives of the SA-CCR framework

### 1 Enhance risk sensitivity:

New methodology for calculating EAD for derivatives, improves risk-sensitivity of the capital framework by using risk factors that are calibrated to reflect the level of volatilities observed over a recent stress period

### 2 Address deficiencies of CEM and Standardized Method:

Unlike prior methodologies, SA-CCR differentiates between margined and unmargined transactions, accounts for variation margin agreements and hedging benefits within netting sets

### 3 Applicable to a wide variety of derivatives:

SA-CCR approach is suitable to be applied to a wide variety of derivative transactions (margined and unmargined, as well as bilateral and centrally cleared) and long settlement transactions

### Benefits

- Recognizes **benefits of margining** (unlike CEM) in the Replacement Cost (RC) calculation
- Allows for meaningful, risk-reducing **relationships between derivative contracts** within a balanced derivative portfolio
- Is more **risk sensitive** than CEM (supervisory factor calibrated to stress period)

### Shortcomings

- Proposes **flat add-on and correlation factors** applicable to broad asset classes
- Requires add-on component to be calculated at the hedging set level which **adds complexity**
- Includes potential floor of 5% to CCR capital requirement that **limits effectiveness of initial margin**



# Calculation of Exposure At Default (EAD) under SA-CCR

$$EAD_{SA-CCR} = Alpha \times Replacement\ Cost + (Multiplier \times Add-on)$$

## Alpha

- Supervisory parameter with a fixed value of 1.4 or 1.0 (for commercial end-users)
- Analogous to Alpha value set for Internal Model Method (IMM)

X

## Replacement Cost (RC)

- Current replacement costs (current fair value of the trade)
- Considers collateral and margining
- Formula to calculate replacement cost is different for (1) **unmarginated** and (2) **marginated** transactions (trades)

### 1 Replacement Cost for Unmarginated Transactions

$$RC = MAX [V - C; 0]$$

V: Current market value of derivative contract

C: Net haircut collateral held by bank

### 2 Replacement Cost for Marginated Transactions

$$RC = MAX [V - C; TH + MTA - NICA; 0]$$

TH: Threshold

MTA: Minimum Transfer Amount

NICA: Net Independent Collateral Amount

+

## Potential Future Exposure (PFE) Multiplier x Add-On

- PFE represents a potential increase in counterparty credit exposure in the future
- Calculated for 5 different asset classes: credit, commodities, equity, foreign exchange, and interest rate
- Accounts for over-collateralisation and negative mark-to-market values
- Reduces add-on in these cases
- <sup>1</sup> $Multiplier = MIN\{1; Floor + (1 - Floor) \times \exp((V - C) / (2 \times (1 - Floor) \times [Add-on]^{\text{aggregate}}))\}$
- Depends on volatility of the underlying

<sup>1</sup> The next page will provide a focus on the calculation of Potential Future Exposure multiplier

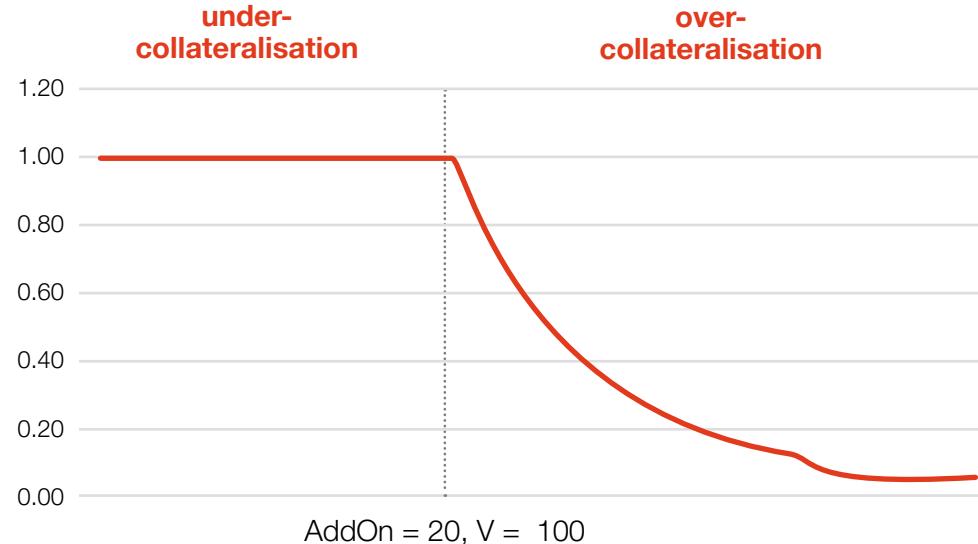


# Calculation of Potential Future Exposure (PFE) multiplier

Potential Future  
Exposure (PFE)  
Multiplier  $\times$  Add-On

- PFE represents a potential increase in counterparty credit exposure in the future
- Calculated for 5 different asset classes: credit, commodities, equity, foreign exchange, and interest rate
- Accounts for over-collateralisation and negative mark-to-market values
- Reduces add-on in these cases
- <sup>1</sup>Multiplier=MIN{1;Floor+(1-Floor)xexp((V-C)/(2x(1-Floor)x[Add-on]^aggregate))}
- Depends on volatility of the underlying

$$\text{Multiplier} = \text{MIN} \{1; \text{Floor} + (1 - \text{Floor}) \times \exp \left( \frac{V - C}{2 \times (1 - \text{Floor}) \times \text{AddOn}^{\text{aggregate}}} \right)\}$$



- Multiplier reduces PFE in case of over-collateralisation (excess collateral,  $C > V$ ) and negative market values ( $V < 0$ ).
- The higher the over-collateralisation the lower the multiplier.
- If there is no over-collateralisation the multiplier is 1.
- Floor of 5%, such that the PFE  $> 0$

# Derivation of the add-on

Add-On corresponds to the amount of potential change in the current replacement cost within one year or during margin period of risk.

Assignment to Asset class and Hedging set

Determination of Supervisory Duration

Maturity Factor

Net Effective Notional under Variance - Covariance Sum

Supervisory Factor

Aggregation of Asset classes and Hedging sets

A supervisory duration factor is applied to adjust position-level notional (converted to domestic currency) depending on the maturity of the contract

A maturity factor is applied to reflect the length of exposure period over which the defaulted portfolio is exposed to changes in value

The net effective notional for each bucket  $k$  is calculated as the sum of the adjusted notionals for each trade  $i$  in the bucket, multiplied by the supervisory delta factor to reflect directionality

The netting-set level net effective notionals are multiplied by 0.5% to obtain the Add-On

The Add-On for a portfolio is the sum of the Add-Ons for each hedging set in the portfolio



$$D_k = \sum_{i \in \text{bucket } k} \text{Notional}_i \times SD_i \times \frac{3}{2} \sqrt{\frac{\text{MPOR}}{1Y}} \times \delta_i$$



$$\text{AddOn}^{\text{Aggregate}} = \sum_j \text{AddOn}_j$$

# Overview of the hedging set concept

- BCBS incorporated the effects and impacts of hedging mechanisms in the development of SA-CCR requirements
- The methodology for calculating the add-on's for each asset class hinges on the key concept of a supervisory "hedging set"
- The methodologies for "building" hedging sets according to SA-CCR are summarised in the table below

ASSET CLASS	HEDGING SET	OFFSET
Interest Rate	Given Maturity Buckets (MB) per Currency 1. [MB <1 year] 2. [1 year ≤ MB ≤5 years] 3. [MB > 5 years]	<ul style="list-style-type: none"><li>• Full within same MB</li><li>• Partially across different MBs</li></ul>
Foreign Exchange	Currency pair	<ul style="list-style-type: none"><li>• Full</li></ul>
Equity	Entity	<ul style="list-style-type: none"><li>• Full, if same Entity</li><li>• Partially across different Entities</li></ul>
Credit	Entity	<ul style="list-style-type: none"><li>• Full, if same Entity</li><li>• Partially across different Entities</li></ul>
Commodity	Categories of commodity derivatives (Energy, Metal, Agricultural and Other)	<ul style="list-style-type: none"><li>• Full, if same commodity type</li><li>• Partially across commodity types</li></ul>



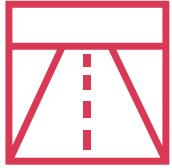
## Consequence

The add-on will vary based on the number of hedging sets that are available within an asset class.



# Fundamental Review of the Trading Book / Credit Valuation Adjustment

# Key considerations when implementing FRTB/CVA



## Infrastructure and growth plans dictate IMA versus SA election

Electing IMA can be costly and costs depends on trading desk.

For larger/growing flow businesses with liquid underlying products, investing in infrastructure to get IMA approval is recommended.

For smaller desks and/or less liquid and complex desks, IMA approval is too costly.



## Systems/operational overhaul may be more optimal

FRTB is significantly more complex in calculations, governance and data needs, especially for IMA trading and CVA-SA.

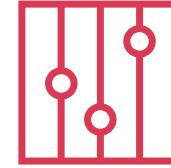
Depending on current state and scope of infrastructure, it may be more optimal to overhaul operating model of current risk/modeling/PnL infrastructure and process for long term sustainability.



## IMA risk factor governance is a significant hurdle

Getting and maintaining IMA approval requires careful selection of risk factors that has appropriate depth to explain PnL in PLA/backtesting and also has sufficient market observable price discovery per FRTB prescription (RFET).

Governance around market data will require upgrades to related processes and potential streamlining of front-to-back market data.



## CVA-SA suited for sophisticated CVA models and hedging

CVA-SA allows for more capital efficiency if the bank can demonstrate proper governance around CVA trading desk set up and models/calculations on par with industry standard.

If bank has material CVA hedging program, investing in upgrading infrastructure and governance to utilize CVA-SA is desirable.



## Reoptimization of banking vs trading designation

FRTB requires reclassification of banking and trading book based on highly prescriptive product-based designations, which can lead to significant added governance.

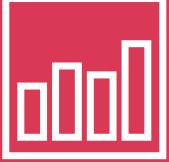
This change may require re-optimization of strategy and hedges, as needed.

# Overcoming FRTB/CVA implementation challenges



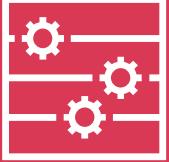
## Common issues achieving FRTB/CVA requirements

- For IMA, increased **operational complexity** with multiple data sources e.g. improve RFET eligibility, including tracking internal trade quotes.
- For SA, **harmonizing sensitivity calculations** across all systems/ business units and conforming to BCBS prescribed risk buckets.



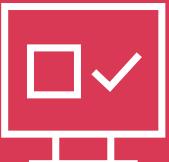
## Data requirements

- Inconsistent and redundant data infrastructure** across market risk, credit risk, BU Risk and PnL controller groups.
- Computational needs**, e.g. PLA full revaluation enhancements.
- Increased data volume demand**.



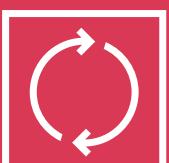
## Technology and Operational processes

- New PLA test requires **significant governance** and front office pricing models to synchronize with back office risk models.
- Products with pricing gaps during **stress periods** are problematic.



## Model Documentation and Validation

- FRTB implementation will **compete for same resources** at same time as LIBOR transition, creating significant overload and delivery risks during 2021-23.
- For new interest rates risk factors associated with LIBOR transition, there may not be **sufficient history of market data**.



## Overlap with LIBOR transition



## Approach to addressing these issues

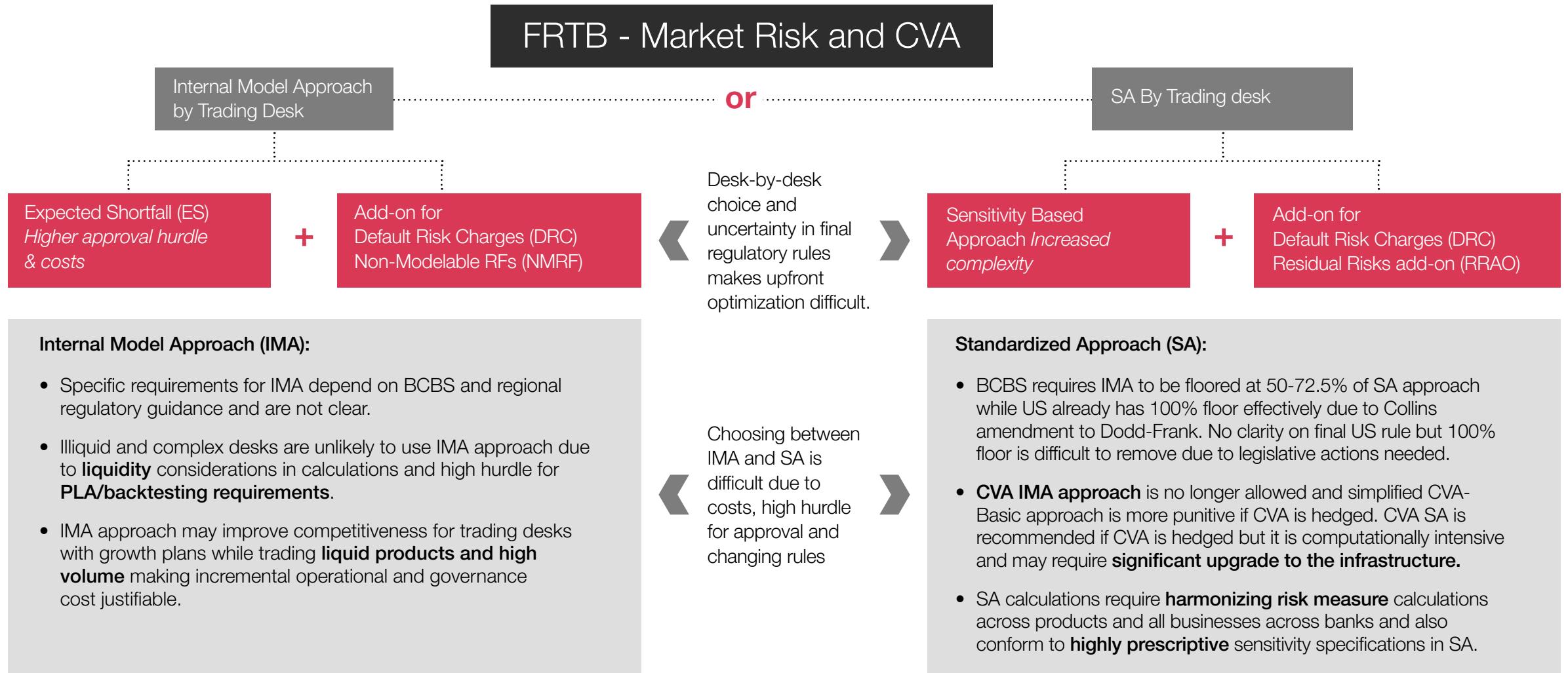
- Enhance and streamline data governance** across front-office and risk systems.
- Create a **standardized nomenclature** across all reference products.
- Normalize database layers** to enable cloud computing and add elasticity.

- Ensure that risk **systems are streamlined/upgraded** and are consumable by downstream models (e.g., Market/Credit/BU Risk, PnL controller).
- Implement **development framework** to accelerate upgrade process.
- Reassess depth and timeliness of **business processes and governance**.

- Gap analysis** for PLA tests for key products/desks/models.
- Improve **front to back governance processes**, e.g. create process to monitor cliff effects if desk become IMA ineligible during stress period.

- Anticipate overload and delivery risks** and dedicate resources to simultaneously implement FRTB and LIBOR transition.
- Develop data** as needed for new interest rate risk factors per FRTB requirements.

# FRTB permits a choice between SA and IMA



# Potential impacts of FRTB/CVA

## MARKET RISK

	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
IMA: Replace VaR and SVaR with ES	...	<ul style="list-style-type: none"> <li>Double counting in current RWA calculations (VaR + Stressed VaR) is removed by using single Expected Shortfall calculation</li> <li>The size of ES could be higher or lower compared to VaR</li> </ul>	<ul style="list-style-type: none"> <li>For 100MM S&amp;P, 99% 10d VaR+SVaR is (21mm+26mm=47mm) but 97.5% ES is 24mm (i.e. half)</li> <li>It is possible however that ES for some portfolios could be higher than VaR+SVaR if the tail risk (extreme loss scenario) is huge</li> </ul>
Switch to SA (IMA is costly)	...	<ul style="list-style-type: none"> <li>IMA approval is a high hurdle and is reassessed on monthly basis</li> <li>Sensitivity based SA improve alignment of economic hedging in regulatory capital requirements</li> </ul>	<ul style="list-style-type: none"> <li>Structured desk may be difficult to get approved for IMA and illiquid desk IMA may be too high compared to SA</li> <li>SA RWA can be less punitive if desk hedges based on sensitivities</li> </ul>
IMA: complex models	↗	<ul style="list-style-type: none"> <li>Untested risk measures (e.g., ES, sensitivity correlation matrix)</li> <li>Intraday reporting and limit management is required</li> </ul>	<ul style="list-style-type: none"> <li>VaR is used by banks for 25yr+ and is well understood. New FRTB risk measures are theoretical and may behave unexpectedly with market/portfolio shifts</li> </ul>
IMA: Increase in liquidity horizon	↗	<ul style="list-style-type: none"> <li>Current product-agnostic 10d liquidity horizon is replaced by product-specific FRTB liquidity horizons of 10d to 120d. Impact depends on business mix</li> </ul>	<ul style="list-style-type: none"> <li>HY portfolio hedged with SPX put hedges will receive significantly less hedging benefit due to liquidity mismatch</li> </ul>
CVA double count	↗	<ul style="list-style-type: none"> <li>Banks with IMM CVA approval currently are required to switch to more conservative SA-CVA (standard or basic) approach causing a potential double count with stressed counterparty losses in CCAR</li> </ul>	<ul style="list-style-type: none"> <li>BCBS has already shown some flexibility on multiplier scalar given significant increase by reducing multiplier from 1.25 to 1 for SA and from 1 to 0.65 for BA-CVA.</li> </ul>
SA CVA: Exposure hedges benefit	↘	<ul style="list-style-type: none"> <li>SA-CVA allows near-full hedging benefit for proxy credit spread hedge as well as underlying exposure hedges</li> </ul>	<ul style="list-style-type: none"> <li>~90% of CVA at most banks is driven by long-dated interest rates swaps; allowing underlying rates hedges in SA-CVA will align RWA with economic hedging on CVA desk</li> </ul>
IMA: Model validation more difficult	↗	<ul style="list-style-type: none"> <li>In addition to VaR backtesting currently required, FRTB requires P&amp;L Attribution (PLA) testing with quantitative hurdles</li> </ul>	<ul style="list-style-type: none"> <li>For less liquid and more exotic desks, it may be unrealistic to maintain IMA approval given strict PLA test requirement on monthly basis as model often deviate from actual P&amp;L significantly</li> </ul>

↗ Potential increase

...

Uncertain

↘ Potential decrease



# Considerations for selecting an approach to CVA

Key characteristics

Regulatory Approval

Hedge benefit

Electon considerations

## SIMPLE CVA

## BA-CVA

## SA-CVA (BASEL IV)

**Not applicable for large banks**

(uses 8% of CCR RWA)

**Simple**

(Exposure based; similar to Basel III SA calculations)

**Complex**

(uses model sensitivities, excludes default)

**Eligibility criteria**

<100Bn OTC notional

**Not Required**

**Required**

(model validation, CVA desk set up regulations, standardized risk factors)

**No Hedge benefit**

**Partial**

(Allows partial credit spread hedge offset for CDS but no underlying exposure hedge benefits)

**Significant**

(Allows near-full hedge benefit for credit AND exposure hedges (e.g. IR))

**No incremental operational cost**

(simply double CCR capital charge)

**Appropriate if:**

Model/governance approval is a challenge

and/or

Using CCR calculation for CVA is cost effective

and/or

CVA underlying exposure is not materially hedged

**Appropriate if:**

CVA is **well-hedged** as BAU practice and **models/governance** meet regulatory expectations (CVA models need to be robust and should produce (linear-only) FRTB risk sensitivities)

**CVA Stressed Capital Buffer (SCB) double counting:** Banks are required to shift from IMA to new SA calculations effectively increasing RWA by 100% of SA. Inclusion of CVA risks in SA RWA (ratio denominator), as well as CCAR SCB (ratio numerator), double counts CVA through SCB.



# Operational Risk



# Key considerations when implementing Operational Risk in Basel IV



## Amplification of operational risk losses

There is considerable uncertainty around implementation of the operational risk framework into the US rules.

Operational risk RWA under the SA may be greater than the current AMA due to Internal Loss multiplier; The impact of operational risk losses on capital may be amplified due to capital requirements driven by the SCB through CCAR operational risk losses.



## Keeping up with operational loss data requirements

Banks should have robust processes for appropriately capturing operational risk loss data, including loss dates, accounting dates and recovery (legal and insurance) data.

High-quality operational loss data must extend back 10 years



## System enhancements to capture and log operational events

Technology systems should be comprehensive and linked to the General Ledger to facilitate the capture of operational loss data, including the required operational loss data elements.

Banks need to have independent assurance that operational loss tracking systems, processes, and controls provide for high-quality data.

# Overcoming Operational Risk implementation challenges

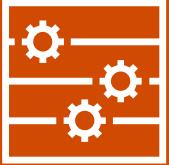


## Data requirements



### Common issues achieving operational risk requirements

- Banks must continue to implement **robust processes** for appropriately **capturing operational risk loss data**, including loss dates, accounting dates and recovery (legal and insurance) data.
- Banks may not have a full ten years of **high-quality operational loss data**.



## Technology and Operational processes

- Many banks have developed **homegrown systems for capturing operational loss data**. These systems may need to be enhanced to capture all of the required operational loss data elements.
- Banks need to continue to have **independent assurance** that operational loss tracking systems, processes and controls provide for high-quality data.



## Capital Requirements

- **Required capital under Basel IV may increase** due to potential amplification of operational losses between Basel IV and CCAR/ DFAST.



### Approach to addressing these issues

- **Refine suite** of existing operational risk capital policies and procedures
- Develop data governance model for operational loss data
- **Perform lookback reviews** to review and cleanse historical operational loss data
- **Request regulatory approval** for using five years of operational loss data, if needed

- Develop **capabilities within existing operational loss systems** to capture required data elements
- **Include annual assessments** of operational risk capital modeling within the scope of internal audit plans, model validation plans and third-party assessments

- **Clearly articulate operational risk RWA calculation methodologies** and assumptions for Basel IV and CCAR/ DFAST in Basel Pillar III disclosures, 10-Qs, 10-Ks and CCAR/DFAST annual stress tests
- **Benchmark operational risk RWA against peer institutions** to confirm efficacy of operational loss modeling

# Calculating operational risk capital under Basel III

Advance Approach banks must calculate regulatory capital using both the SA and the Advanced Approach. The lower of the resulting regulatory capital CET1 ratios is then used for determining Basel III regulatory capital.

Basel III  
Standardized  
Approach

$$\text{CET}_1 \text{ ratio} = \left( \frac{\text{CET}_1 \text{ capital}}{(\text{credit risk RWA} + \text{market risk RWA})} \right) \times 100$$

Basel III  
Advanced  
Approach

$$\text{CET}_1 \text{ ratio} = \left( \frac{\text{CET}_1 \text{ capital}}{(\text{credit risk RWA} + \text{market risk RWA} + \text{operational risk RWA})} \right) \times 100$$

- Operational risk RWA is not included in the denominator of the CET1 ratio.
- Banks use the SA when performing annual CCAR stress tests. Stressed operational risk losses under different Fed scenarios are incorporated into PPNR. Current period operational losses flow through retained earnings into CET1 capital.

- Operational risk RWA is included in the denominator of the CET1 ratio.
- Operational risk RWA is calculated using the AMA, which is a combination of historical internal and external operational loss data, BECIFs and forward-looking scenario analysis of low probability/high severity operational loss events. Each bank has generous latitude in using the four AMA components to model operational risk RWA.

Under the Collins Amendment, banks subject to annual CCAR tests must hold minimum capital via the SCB equal to the peak-to-trough decrease in the CET1 ratio under the Fed's severely adverse scenario, subject to a floor of 2.5% with an unbound maximum. This effectively makes CCAR (not Basel III) the mechanism for determining required operational risk capital for these banks.



# Calculating operational risk capital under Basel IV

Basel IV introduces a new SA for determining operational risk RWA

Basel IV  
Standardized  
Approach

$$\text{CET}_1 \text{ ratio} = \left( \frac{\text{CET}_1 \text{ capital}}{(\text{credit risk RWA} + \text{market risk RWA} + \text{operational risk RWA})} \right) \times 100$$

- Operational risk RWA is included in the denominator of the CET1 ratio.
- Banks use the SA when performing annual CCAR stress tests. Stressed operational risk losses under different Fed scenarios are incorporated into PPNR. Current period operational losses flow through retained earnings into CET1 capital.

Calculation of  
Operational  
Risk RWA

## Calculation of Operational Risk RWA

### 1 Calculate Interest, Leases and Dividend Component (ILDC)

$$\text{DLDC} = \min(\text{Abs(interest income - interest expense)}, 2.25\% \times \text{interest earning assets}) + \text{dividend income}$$

### 2 Calculate Services Component (SC)

$$\text{SC} = \max(\text{other operating income}, \text{other operating expense}) + \max(\text{fee income}, \text{fee expense})$$

### 3 Calculate Financial Component (FC)

$$\text{FC} = \text{Abs(Net P & L trading book)} + \text{Abs(Net P & L banking book)}$$

### 4 Calculate BI

$$\text{BI} = \text{ILDC} + \text{SC} + \text{FC}$$

### 5 Calculate BI Component (BIC)

$$\text{BIC} = \text{BI} \times \text{BI marginal coefficient (12%, 15%, 18%)}$$

### 6 Calculate Loss Component (LC)

$$\text{LC} = 15 \times \text{average annual operational risk losses over the previous 10 years}$$

### 7 Calculate Internal Loss Multiplier (ILM)

$$\text{ILM} = \ln(\exp(1) + (\text{LC}/\text{BIC})^{0.8})$$

### 8 Calculate Operational Risk RWA

$$\text{RWA} = 12.5 \times (\text{BIC} \times \text{ILM})$$

Average annual operational risk losses over the preceding 10 years and other financial statement data are used to derive operational risk RWA. The impact of the SCB under the Collins Amendment is expected to remain the same under Basel IV.



# Calculating operational risk capital under Basel IV

Under the new SA, operational risk losses may be amplified between Basel IV operational risk RWA and CCAR PPNR projections.

## Illustrative Example

	Stress period CCAR		
	Year 0	Year 1	Year 2
Credit Risk exposure	2,500	2,500	2,500
Allowance for Expected Credit Losses	-50	-55	-60
Increase Allowance due to stress losses		-5	-5
<b>Exposure at Default for RWA</b>	<b>2,450</b>	<b>2,440</b>	<b>2,435</b>
RWA (50% RW)	1,225	1,220	1,218
Operational Risk RWA under Basel III SA	-	-	-
Operational Risk RWA under Basel IV SA	200	200	200
<b>Total RWA</b>	<b>1,425</b>	<b>1,420</b>	<b>1,418</b>
CET 1 Capital	150	150	125
- Stress losses Credit Risk		-5	-5
- Stress losses Operational Risk		-20	-20
CET 1 Capital after stress losses	150	125	100
<b>CET1 Ratio (without Operational Risk RWA)</b>	12.24%	10.25%	8.21%
<b>CET1 Ratio (with Operational Risk RWA)</b>	<b>10.53%</b>	<b>8.80%</b>	<b>7.05%</b>
<b>Difference</b>	<b>-1.72%</b>	<b>-1.44%</b>	<b>-1.16%</b>

- Basel IV introduces operational risk RWA in 2023, and a **concern exists that operational risk RWA increases capital requirements already captured in the SCB**
  - This potentially **amplifies operational risk losses** captured CET1 capital ratio through PPNR that flows through retained earnings and reflected in CET1 capital (the numerator) and operational risk RWA (the denominator)
  - **There is no corresponding balance sheet mechanism for reducing CCAR stressed operational risk losses.**

# Regulators can pull many levers to keep Basel IV capital neutral

These are the most impactful:

## ⊖ Real Estate Exposures

Maintain BCBS proposed risk weights for loan-to-value bands

## ↖ Corporate Exposures

Align the definition of investment grade with current industry practices and internal processes for evaluating and measuring risk

## ⊖ Retail Exposures

Maintain BCBS proposed risk weights for retail and credit card balances

## ⊖ Capital Floors

Align Collins Amendment with proposed capital floors to effectively keep capital neutral

## ⊖ CVA

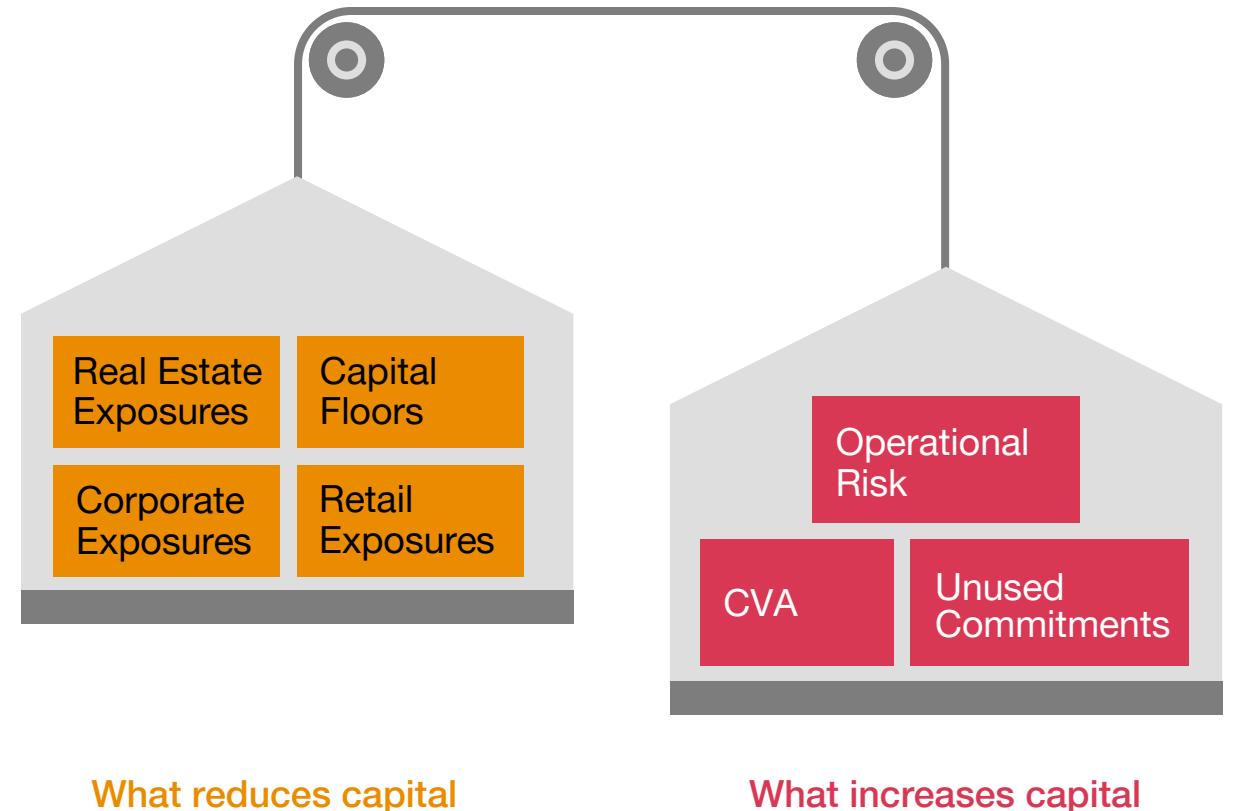
Address potential double count of market risk losses between Standardized Approach (SA) and CCAR by further reducing the multiplier in the SA

## ⊖ Unused Commitments

Decrease the proposed Credit Conversion Factor (CCF) of 10% or maintain the current 0% CCF for unused unconditionally cancelable commitments

## ⊖ Operational Risk

Address potential double count of operational risk RWA in the SA and stress losses in CCAR through the SCB



Likelihood of Incorporation

↖ High   ⊖ Medium   ⊙ Low

# Details on most impactful capital neutrality levers in Basel IV

CREDIT RISK	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
Real Estate Exposures	↓	<ul style="list-style-type: none"> <li>Introduction of risk weights scaled based on LTV band for both residential and commercial mortgages</li> </ul>	<ul style="list-style-type: none"> <li>Resi mortgage with 80% LTV proposed to receive a Risk Weight (RW) of 40%, down from 50% and can fall to 20% if LTV &gt; 50%</li> <li>CRE with LTV ≤ 60% to decrease from 100% to 60%</li> </ul>
Corporate Exposures	↓	<ul style="list-style-type: none"> <li>Introduction of reduced risk weight for investment grade corporate exposures with public securities on an exchange. Investment grade cannot reference external credit ratings and will need to be defined based the borrower's risk profile.</li> </ul>	<ul style="list-style-type: none"> <li>Investment grade corporate (including insurance companies) exposures meeting the new definition, which could be principles-based or prescribed by quantitative criteria, can be risk weighted at 65% instead of 100%</li> </ul>
Retail Exposures	↓	<ul style="list-style-type: none"> <li>Introduction of the retail exposure class in the Standardized Approach will reduce risk weights for retail and credit card balances</li> </ul>	<ul style="list-style-type: none"> <li>Certain retail products &lt;\$1M and not material to the portfolio will be assigned a 75% RW instead of 100%</li> <li>Balances for customers that repaid their credit balance in full every month over the past 12 months are assigned 45% instead of 100%</li> </ul>
Unused Commitments	↗	<ul style="list-style-type: none"> <li>The Credit Conversion Factors for certain off balance sheet commitments are adjusted, generally up</li> </ul>	<ul style="list-style-type: none"> <li>The CCF for Unused Credit Card lines of credit will increase from 0% to 10%, and unused commitments with a maturity &lt; 1 year will increase from 20% to 40%</li> </ul>
CVA	↗	<ul style="list-style-type: none"> <li>Banks with IMM CVA approval currently are required to switch to more conservative SA-CVA (standard or basic) approach causing a potential double count with stressed counterparty losses in CCAR</li> </ul>	<ul style="list-style-type: none"> <li>BCBS has already shown some flexibility on multiplier scaler given significant increase by reducing multiplier from 1.25 to 1 for SA and from 1 to 0.65 for BA-CVA.</li> </ul>
Operational Risk	↗	<ul style="list-style-type: none"> <li>Introduction of new Operational Risk RWA requirements will be calculated based on a financial statement based proxy and an Internal Loss Multiplier, which is a scaling factor that is based on a bank's average historical losses</li> </ul>	<ul style="list-style-type: none"> <li>Capital requirements for Operational Risk are currently considered through CCAR stress losses and are not in the SA. Introducing Operational Risk RWA in the SA creates another capital requirement for Operational Risk potentially double-counts risk</li> </ul>
Capital Floors	↓	<ul style="list-style-type: none"> <li>A capital floor as a percentage of the Standardized Approach for Advanced Approach banks is introduced</li> </ul>	<ul style="list-style-type: none"> <li>The output floor will be phased-in between 2023 (50%) and 2028 (72.5%), meaning that for certain banks the Advanced Approach may become the higher capital requirement</li> </ul>

↗ Potential increase

… Uncertain

↘ Potential decrease

# Other increases and decreases to RWA from Basel IV

(1 of 2)

## MARKET RISK

IMA: Replace VaR and SVaR with ES	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
Switch to SA (IMA is costly)	...	<ul style="list-style-type: none"> <li>MA approval is a high hurdle and is reassessed on monthly basis</li> <li>Sensitivity based SA improve alignment of economic hedging in regulatory capital requirements</li> </ul>	<ul style="list-style-type: none"> <li>Structured desk may be difficult to get approved for IMA and illiquid desk IMA may be too high compared to SA</li> <li>SA RWA can be less punitive if desk hedges based on sensitivities</li> </ul>
Banking vs Trading overhaul	↗	<ul style="list-style-type: none"> <li>Banking vs Trading designation will be prescriptive based on underlying instrument and is more conservative</li> </ul>	<ul style="list-style-type: none"> <li>Well-optimized banking book setup and hedges will need to be realigned in a less capital efficient manner per FRTB prescription</li> </ul>
IMA: complex models	↗	<ul style="list-style-type: none"> <li>Untested risk measures (e.g., ES, sensitivity correlation matrix)</li> <li>Intraday reporting and limit management is required</li> </ul>	<ul style="list-style-type: none"> <li>VaR is used by banks for 25yr+ and is well understood. New FRTB risk measures are theoretical and may behave unexpectedly with market/portfolio shifts</li> </ul>
IMA: Increase in liquidity horizon	...	<ul style="list-style-type: none"> <li>Current product-agnostic 10d liquidity horizon is replaced by product-specific FRTB liquidity horizons of 10d to 120d. Impact depends on business mix</li> </ul>	<ul style="list-style-type: none"> <li>HY portfolio hedged with SPX put hedges will receive significantly less hedging benefit due to liquidity mismatch</li> </ul>
SA CVA: Exposure hedges benefit	↘	<ul style="list-style-type: none"> <li>SA-CVA allows near-full hedging benefit for proxy credit spread hedge as well as underlying exposure hedges</li> </ul>	<ul style="list-style-type: none"> <li>~90% of CVA at most banks is driven by long-dated interest rates swaps; allowing underlying rates hedges in SA-CVA will align RWA with economic hedging on CVA desk</li> </ul>
IMA: Model validation more difficult	↗	<ul style="list-style-type: none"> <li>In addition to VaR backtesting currently required, FRTB requires P&amp;L Attribution (PLA) testing with quantitative hurdles</li> </ul>	<ul style="list-style-type: none"> <li>For less liquid and more exotic desks, it may be unrealistic to maintain IMA approval given strict PLA test requirement on monthly basis as model often deviate from actual P&amp;L significantly</li> </ul>

↗ Potential increase

...

↘ Potential decrease

# Other increases and decreases to RWA from Basel IV

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## CREDIT RISK

	Potential RWA impact	DESCRIPTION	EXAMPLES AND CONSIDERATIONS
Banks	↗	<ul style="list-style-type: none"> <li>RW for long-term bank exposures will increase since Basel IV introduces four grades of RW% (30%, 40%, 75% and 150%) based on counterparty's compliance with certain regulatory requirements and the bank's CET 1 Ratio and Leverage Ratio</li> </ul>	<ul style="list-style-type: none"> <li>LT exposure to Bank A will increase from 20% to 40%</li> <li>LT exposure to Bank B will increase from 20% to 30% if CET 1 &gt;14% and Tier 1 Leverage Ratio &gt;5%</li> </ul>
Financial Institutions	↘	<ul style="list-style-type: none"> <li>RWA for Certain financial institutions will decrease because they may now potentially be treated as bank exposures</li> </ul>	<ul style="list-style-type: none"> <li>Short term exposures to "grade A" Asset Managers will decrease from 100% to 20%</li> <li>Long Term exposures to "grade B" Asset Managers will decrease from 100% to 75%</li> </ul>
Financial Collateral	↗	<ul style="list-style-type: none"> <li>Haircuts applied to non-sovereign financial collateral for credit risk mitigation increase in certain cases</li> </ul>	<ul style="list-style-type: none"> <li>The haircut for equities listed on a main index increases from 15% to 20% in Repo Style transactions</li> </ul>
Securizations	...	<ul style="list-style-type: none"> <li>Simple, Transparent and Comparable (STC) securitizations are introduced</li> <li>The RW% floor is decreased from 20% to 10% (STC) and 15% (Non-STC)</li> </ul>	<ul style="list-style-type: none"> <li>STC securitizations will see RWA go down due to lower floors</li> <li>Non-STC will see increased correlation parameter from 0.5 to 1, increasing the RWA in the Simplified Supervisory Formula Approach calculation</li> </ul>
Project Financing	...	<ul style="list-style-type: none"> <li>The introduction of an exposure class for project financing increases RWA for pre-operational projects</li> <li>High Quality operational projects see RWA decrease</li> </ul>	<ul style="list-style-type: none"> <li>The RW for Pre-operational projects (e.g. bridge construction) will increase from 100% to 130%</li> <li>The RW for High quality operational projects decreases to 80% from 100%</li> </ul>

↗ Potential increase

... Uncertain

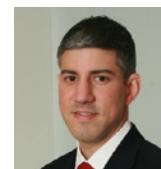
↘ Potential decrease



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