

Basel IV

BCBS finalises reforms on Risk Weighted Assets (RWA)

*Finally finalised: the Basel
Committee's announcement
of December 2017*

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On December 7th, 2017 the Basel Committee on Banking Supervision published finalised rules on a number of topics concerning the calculation of risk weighted assets. These new rules will fundamentally change the methods and approaches used when calculating RWA and capital ratios for all banks, big and small, complex or not, in the coming years. While officially termed the finalisation of Basel III, the industry has long since started to call the package of reforms Basel IV, to take account of the huge scale of changes. This brochure will give you an overview of Basel IV and how banks can deal with the ensuing challenges.

In direct reaction to the financial crisis of the years 2007/08, the Basel Committee published a number of ad hoc measures designed to target the most egregious shortfalls of the Basel II rules, especially with regard to market risk and securitisations (termed by some Basel 2.5). A more comprehensive reaction to the crisis led to the creation of the Basel III framework, addressing not only the topic of regulatory own funds but also introducing new minimum ratios on leverage and liquidity (LCR, NSFR). However, the Basel III reforms refrained from addressing issues connected to the calculation of risk weighted assets, that determine the denominator of capital ratios.

In 2012, even before Basel III had been implemented in the EU, the BCBS began to focus on RWA calculation once again, seeking more fundamental changes to the rules covering market risks and securitisations than had been agreed upon in 2009. These efforts hence became called Basel 3.5. However, as more and more topics were set on the agenda – from counterparty risk to investment funds and finally credit risk and operational risk, it became clear that this was no intermediate step but the most fundamental change to RWA calculation since Basel II.

As it proved to be politically quite difficult to reach an agreement on these topics, it took until 2017 before the final strokes were put in place. This brochure presents the results of this process, giving you an overview of the revised approaches for credit risk, CVA risk and operational risk, as well as providing some thoughts on how they will impact the banking industry and what can be done today to get prepared.

We hope, it will prove useful for you.

Kind regards,



Martin Neisen
Global Basel IV Leader

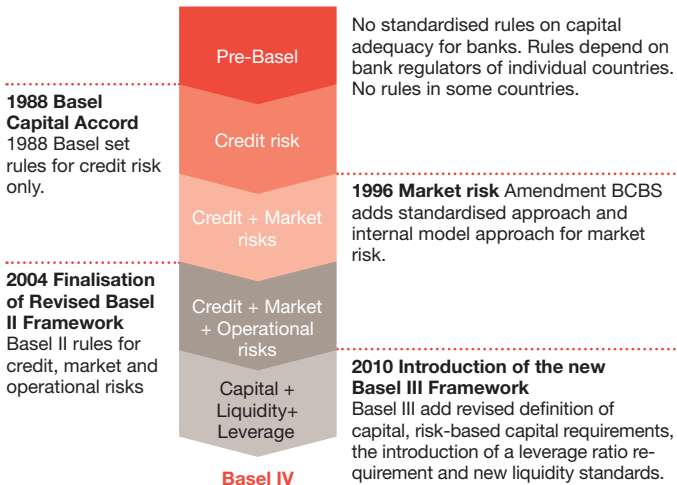


Stefan Röth
National Basel IV Standardised
Approach Workstream Leader

Preface

The Basel IV timeline

Fig. 1 From Basel I to Basel IV



Basel IV is the latest step of a development going back to the 1980s. Specifically, it addresses shortcomings the BCBS identified with regard to the Basel II reforms:

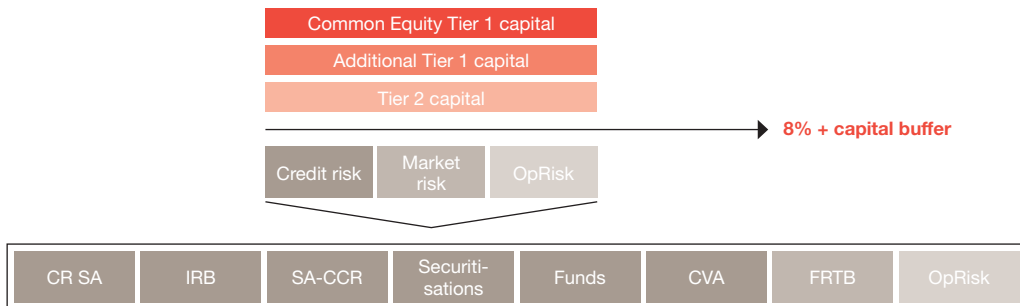
- Internal model based approaches gave banks too much discretion, producing RWA that were neither transparent nor comparable
- Standardised approaches proved to be not risk sensitive enough to produce meaningful results

The crucial link between both are the so called capital floors: in order to reign-in the internal model banks, it became a necessity to provide standardised approaches offering a meaningful alternative way of calculating RWA.

Basel IV in a nutshell

While Basel III, published in 2010, focused mostly on the determination of own funds in the numerator of the capital ratios, Basel IV turns the attention to the denominator and the calculation of risk weighted assets. Within the denominator, no stone remains unturned with all risk types being affected regardless of whether standardised approaches or internal models are being used.

Fig. 2 Focus on RWA calculation



Basel IV in detail

Objectives and Improvements

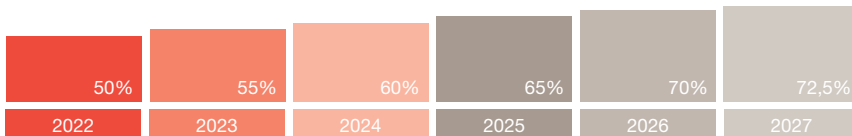
Fig. 3 Introduction of the capital floor

Basel I floor
(until 31.12.2017)

80%

Stepwise increase of the capital floors until 2027

Revisions



- Standardised approach is becoming increasingly important for banks that calculate capital requirements using internal model approaches.
- During the phase-in period, supervisors may exercise national discretion to cap the incremental increase in a bank's total RWAs that results from the application of the floor. The increase of bank's RWA is limited to max. of 25% before the application of the floor.

Example

RWA per approach/Year	2022	2023	2024	2025	2026	2027
SA _{all} (after application of the floor)	60	66	72	78	84	87
IM _{all}	80	80	80	80	80	80
Final	80	80	80	80	84	87

Fig. 4 Foundations of the capital floor

Foundations of the capital floor

Limiting the scope of action

Reducing model risk

Increasing comparability of RWA

Avoiding variation in RWA

Credibility of banks' risk-weighted calculations

Use of standardised approaches to calculate the capital floors

Credit risk: CR SA, Supervisory haircuts for credit risk mitigation

Counterparty risk: SA-CCR

CVA: SA-CVA, Basic-CVA or 100% of a bank's counterparty credit risk capital requirement

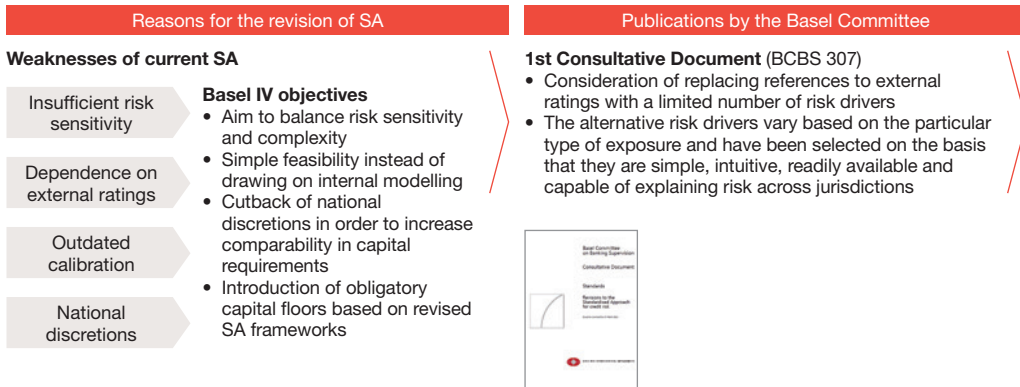
Securitisations: Approach based on external ratings (SEC-ERBA), SEC-SA or $RW=1250\%$

Market risk: FRTB-SA

OpRisk: SA for operational risk

Credit Risk Standardised Approach (CR SA)

Fig. 5 Development of the revised CR SA



Publications by the Basel Committee

Consultation

2nd Consultative Document (BCBS 347)

- Reintroduction of the use of ratings, in a non-mechanistic manner, for exposures to banks, corporates and SL
- Modification of the proposed risk weighting of real estate loans, with loan-to-value ratio as the main risk driver



Finalising

Final Standards (BCBS 424)

- Recalibration of risk weighting for rated exposures and of CCFs
- More risk-sensitive approach for real estate exposures based on the LTV



CR SA: Banks

Fig. 6 Calculation of risk weights for banks

Banks										
BCBS Final Standards	External Credit Risk Assessment (ECRA) <ul style="list-style-type: none"> For rated exposure (additional due diligence analysis required) Base risk weight based on external ratings ranging between 20% and 150% If the due diligence analysis reflects higher risk characteristics, the bank must assign a risk weight at least one bucket higher 					Standardised Credit Risk Assessment (SCRA) <ul style="list-style-type: none"> For unrated exposure (additional due diligence analysis required) There are three grades (A, B, C) ranging between 30% or rather 40% and 150 % Assignment to grade depends on counterparty's compliance with financial obligations, regulatory requirements and due diligence 				
	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B	"Base" RW RW for short- term exposures	Grade A	Grade B	Grade C	
	20%	30%	50%	100%	150%		30%/40%	75%	150%	
	20%	20%	20%	50%	150%	20%	50%	150%		

- Grade A** • Exposures to bank counterparties that have adequate capacity to meet their financial commitments
- Counterparty exceeds the published minimum regulatory requirements (e.g. leverage, liquidity and risk-based capital ratios) as well as buffers (e.g. GSIB surcharge, capital conservation and countercyclical capital buffers)
- Reduced risk weight of 30%, provided that the counterparty bank has a CET1 ratio $\geq 14\%$ and a Tier 1 leverage ratio $\geq 5\%$. The counterparty bank must also satisfy all the requirements for Grade A classification.
- Grade B** • Applicable if counterparty does not meet one or more of the applicable published buffers (e.g. GSIB surcharge, capital conservation and countercyclical capital buffers)
- Grade C** • Applicable, if certain triggers are breached (e.g. minimum regulatory requirements, adverse audit opinion, substantial doubt about the counterparty's ability to continue as a going concern in its financial statements)

Specialised treatment for covered bonds.

CR SA: multilateral development banks

Fig. 7 Calculation of risk weights for MDBs

Multilateral development banks (MDBs)

BCBS
Final
Standards

- A 0% risk weight will be applied to exposures to MDBs that fulfil to the Committee's satisfaction the following eligibility criteria:
 - ✓ very high-quality long-term issuer ratings
 - ✓ strong shareholder support with long-term issuer external ratings of high quality or fund-raising is in the form of paid-in equity/capital and there is little or no leverage
 - ✓ significant proportion of sovereigns
 - ✓ adequate level of capital and liquidity
 - ✓ strict statutory lending requirements and conservative financial policies
- For exposures to all other MDBs, banks incorporated in jurisdictions that allow the use of external ratings for regulatory purposes assign to their MDB exposures the corresponding "base" risk weights:

External rating of counterparty	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
"Base" risk weight	20%	30%	50%	100%	150%	50%

- Banks incorporated in jurisdictions that do not allow external ratings for regulatory purposes will risk-weight such exposures at 50%.

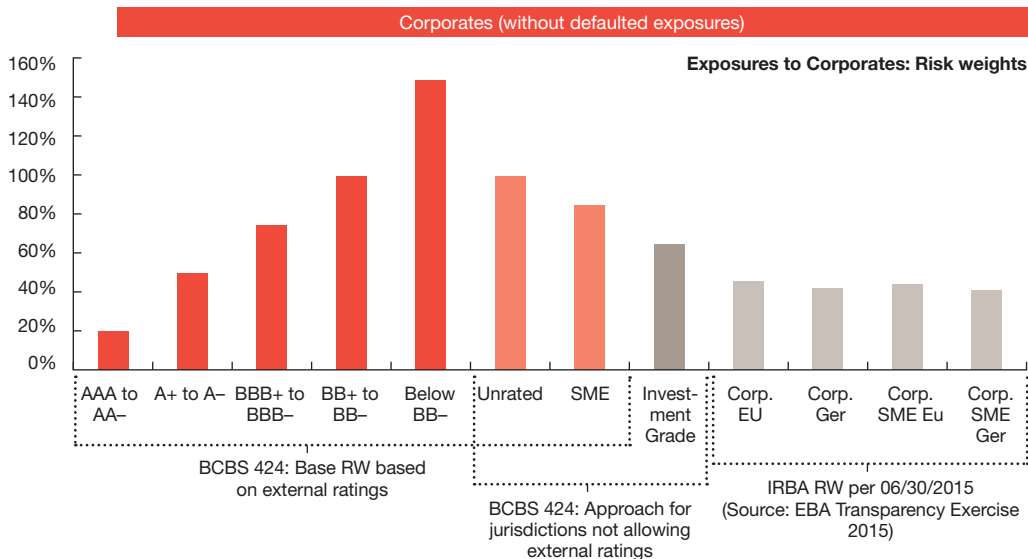
CR SA: corporates

Fig. 8 Calculation of risk weights for corporates

		Corporates (without defaulted exposures)					
		Jurisdiction allowing external ratings			Jurisdiction not allowing external ratings		
BCBS Final Standards		<ul style="list-style-type: none"> Rated Corporate Exposures <ol style="list-style-type: none"> Determination of „Base RW“ according to the following lookup table (additional due diligence analysis required): 					
		External Rating	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-
	“Base” RW	20%	50%	75%	100%	150%	100%
		<ol style="list-style-type: none"> Due diligence to be performed by the banks might result in higher RW (although never in lower RW) 					
		<ul style="list-style-type: none"> Unrated Corporate Exposures <ul style="list-style-type: none"> – RW = 100% 			<ul style="list-style-type: none"> All Corporate Exposures <ul style="list-style-type: none"> – RW = 100% Exemption: Investment Grade Exposures <ul style="list-style-type: none"> – RW = 65% – Criteria to be fulfilled: <ul style="list-style-type: none"> ✓ adequate capacity to meet financial commitments, irrespective of the economic cycle and business conditions ✓ Bank’s Assessment should take into account the complexity of the corporate’s business model, performance against industry and peers and risks of the operating environment ✓ Securities outstanding on a recognised exchange Exemption: Corporate SMEs <ul style="list-style-type: none"> – Exposures to corporate SME (< 50 mill. € total sales) will receive a 85% RW – „Retail SME Exposures“: RW = 75% 		
		<ul style="list-style-type: none"> Exemption: Unrated Corporate SME <ul style="list-style-type: none"> – Exposures to corporate SME (< 50 mill. € total sales) will receive a 85% RW – „Retail SME Exposures“: RW = 75% 					

CR SA: comparison of risk weights for corporates

Fig. 9 RW of corporate exposures



CR SA: Specialised Lending

Fig. 10 Calculation of risk weights for SL

		Specialised Lending						
		Jurisdiction allowing external ratings			Jurisdiction not allowing external ratings			
BCBS Final Standards		Risk weights based on issue-specific external ratings (analog general corporate exposures):						
		AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	Below BB-		
		20%	50%	75%	100%	150%		
							RW	
							Object finance exposures	100%
							Commodities finance exposures	100%
							Project finance exposures (pre-operational phase)	130%
							20Project finance exposures (operational phase)	80%/100%
							<ul style="list-style-type: none"> Project finance exposures in the operational phase which are deemed to be high quality will be risk weighted at 80%, if the following criteria is met: <ul style="list-style-type: none"> ✓ project finance entity that is able to meet its financial commitments in a timely manner ✓ robust against adverse changes in the economic cycle and business conditions ✓ sufficient reserve funds ✓ ... 	

CR SA: Equity, subordinated debt and retail exposures

Fig. 11 Equity and Retail

Equity, Subordinated debt and Retail exposure

BCBS
Final
Standards

Equity and Subordinated debt

- RW = 250% for equity holdings
- RW = 150% for subordinated debt and capital instruments other than equities as well as liabilities that meet the definition of “other TLAC liabilities”
- **Exemption:** RW = 400% for speculative unlisted equity exposures
 - Invested for short-term resale purposes
 - Venture capital or similar investments which are subject to price volatility and are acquired in anticipation of significant future capital gains

Retail exposure

- RW = 75% if the following criteria is met:
 - ✓ Product criterion: revolving credits and lines of credit, personal term loans and leases and small business facilities and commitments
 - ✓ Low value of individual exposures
 - ✓ Granularity criterion
- RW = 100% if exposure to an individual person or persons that do not meet all of the criteria, unless secured by real estate
- **Exemptions:**
 1. RW = 45% for “Transactor” exposures:
 - facilities such as credit cards and charge cards
 - balance has been repaid in full at each scheduled repayment date for the previous 12 months
 - there has been no drawdowns over the previous 12 months
 2. Corporate SMEs:
 - Exposures to corporate SME (< 50 mill. € total sales) will receive a 85% RW
 - „Retail SME Exposures“: RW = 75%

CR SA: Residential Real Estate

Fig. 12 Treatment of RRE collateral

Secured by residential real estate

BCBS
Final
Standards

General Treatment

- Where the operational requirements are met the risk weight to be assigned to the total exposure will be determined based on the exposure's LTV:

LTV ≤ 50%	50% < LTV ≤ 60%	60% < LTV ≤ 80%	80% < LTV ≤ 90%	90% < LTV ≤ 100%	LTV > 100%
20%	25%	30%	40%	50%	70%

- Credit Splitting**
 - RW = 20% for up to 55% of property value
 - RW of the counterparty to the residual part
- RW of the counterparty if operational requirements are not met
- Land Acquisition, Development and Construction (ADC): RW = 150%; reduced to 100% if material pre-sale or pre-lease contracts exist

Income-producing Real Estate (IPRE)

- Where the operational requirements are met the risk weight to be assigned to the total exposure will be determined based on the exposure's LTV:

LTV ≤ 50%	50% < LTV ≤ 60%	60% < LTV ≤ 80%	80% < LTV ≤ 90%	90% < LTV ≤ 100%	LTV > 100%
30%	35%	45%	60%	75%	105%

- RW = 150% if operational requirements are not met
- General treatment:**
 - property that is the borrower's primary residence
 - income-producing residential housing unit
 - residential real estate property to associations or cooperatives of individuals
 - residential real estate property to public housing companies and not-for-profit associations

Operational requirements:

- | | | |
|------------------------|------------------------------------|-----------------------------|
| ✓ Finished property | ✓ Claims over the property | ✓ Prudent value of property |
| ✓ Legal enforceability | ✓ Ability of the borrower to repay | ✓ Required documentation |

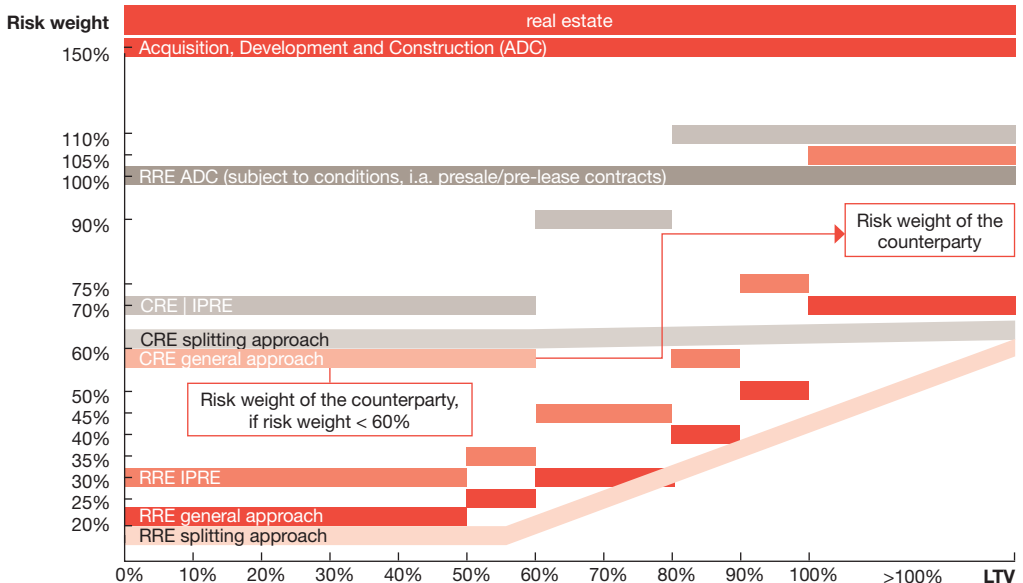
CR SA: Commercial Real Estate

Fig. 13 Treatment of CRE collateral

		Secured by commercial real estate			
BCBS Final Standards		General Treatment		Income-producing Real Estate (IPRE)	
		<ul style="list-style-type: none"> Where the operational requirements are met the risk weight to be assigned to the total exposure will be determined based on the exposure's LTV: 		<ul style="list-style-type: none"> Where the operational requirements are met the risk weight to be assigned to the total exposure will be determined based on the exposure's LTV: 	
		LTV ≤ 60%	LTV > 60%	LTV ≤ 60%	60% < LTV ≤ 80%
		RW = Min (60%; RW of the counterparty)	RW of the counterparty	70%	90%
		<ul style="list-style-type: none"> Credit Splitting <ul style="list-style-type: none"> RW = Min(60%; RW of the counterparty) for up to 55% of property value RW of the counterparty to the residual part RW of the counterparty if operational requirements are not met Land Acquisition, Development and Construction (ADC): RW = 150% 		<ul style="list-style-type: none"> RW = 150% if operational requirements are not met 	
		Operational requirements: <ul style="list-style-type: none"> ✓ Finished property ✓ Legal enforceability ✓ Claims over the property ✓ Ability of the borrower to repay ✓ Prudent value of property ✓ Required documentation 			
				LTV > 80%	110%

CR SA: comparison of risk weights for RRE/CRE

Fig. 14 Real Estate: LTV/Risk Weight matrix



CR SA: further changes

Fig. 15 Further changes to the CR SA: Defaulted Exposures, CCFs and Currency Mismatches

1

Defaulted Exposure

- A defaulted exposure is past due more than 90 days or is an exposure to a defaulted borrower
- RW = 150%: specific provisions are less than 20% of the outstanding amount of the loan
- RW = 100%: specific provisions are equal or greater than 20% of the outstanding amount of the loan or defaulted residential real estate exposures where repayments do not materially depend on cash flows generated by the property securing the loan

2

Off-balance sheet exposure

- Off-balance sheet items under the standardised approach will be converted into credit exposures by multiplying the committed but undrawn amount by a credit conversion factor (CCF)
- A CCF will be applied to the following items:



3

Other assets

- The standard risk weight for all other assets will be 100%
- A 0% risk weight will apply to (i) cash owned and held at the bank or in transit; and (ii) gold bullion held at the bank or held in another bank on an allocated basis, to the extent the gold bullion assets are backed by gold bullion liabilities
- 20% risk weight will apply to cash items in the process of collection

4

Currency mismatch

- For unhedged retail and residential real estate exposures to individuals where the lending currency differs from the currency of the borrower's source of income, banks will apply a 1.5 times multiplier to the applicable risk weight subject to a maximum risk weight of 150%.

Internal Ratings-based Approach (IRB)

The final Basel IV publications soften the earlier proposals for internal ratings-based (IRB) approaches. However, the changes compared to Basel III are still significant. Banks are facing challenges both from an increase in RWA and from implementation issues resulting from the scope limitations, limiting estimation practices and new and/or increased input floors

Fig. 16 Scope reduction of internal models

Challenges

Overall, the revisions to the internal ratings-based approach framework are likely to lead to increases in capital requirements for the affected exposures. These adverse effects are expected to be mainly the result of:

- Basel IV's reduction of the scope of application of the Advanced IRB approach for banks, other financial institutions and larger corporates. The RWA for these exposures should be determined using the Foundation IRB (F-IRB) approach or using the standardised approach
- Equity exposures are placed out of the IRB scope and hence only the standardised approach can be used
- Other exposure classes are not affected by the new requirements

Update on regulatory requirements

Exposure class	Methods available under the new standards	Change in in comparison to current standard
Banks and other financial institutions	SA or F-IRB	A-IRB removed
Corporates belonging to groups with total consolidated revenues exceeding EUR 500m	SA or F-IRB	A-IRB removed
Other corporates	SA, F-IRB or A-IRB	No change
Specialised lending	SA, slotting, F-IRB or A-IRB	No change
Retail	SA or A-IRB	No change
Equity	SA	All IRB approaches removed

Fig. 17 Introduction of new floor values

Challenges

The changes resulting from the input floors and limiting estimation practices requires an increased number of resources for recalibrating affected IRB models. Recalibrated models will need to be re-validated, and significant changes may well require supervisory approval

- The changes in the models will requires adjustments to all relevant model policies, improving governance and internal controls to ensure adherence to the new requirements
- From a business perspective, changes to current product structures and potentially the development of new products may be warranted. In addition, an increased RWA may be accounted for through pricing model changes

Under the new requirements, the 1.06 conservatism scaling factor that applies to the RWA amounts for credit risk under the IRB approach will no longer apply

Update on regulatory requirements

PD Floors		LGD Floors			
Asset class	Floor	Asset class	Floor	Asset class	Floor
Corporate	5%	Mortgages	5%	Retail/Corp secured by financial collateral	0%
Retail QRRE ¹	1%	QRRE	50%	Retail/Corp secured by receivables	10%
Retail Other ¹	5%	Other retail unsecured	30%	Retail/Corp secured by real estate	10%
		Corporate unsecured	25%	Retail/Corp secured by other physical collateral	15%

¹ PD should be higher than the one-year PD associated with the internal borrower grade to which the pool of retail exposures is assigned

CVA Risk Capital Charge

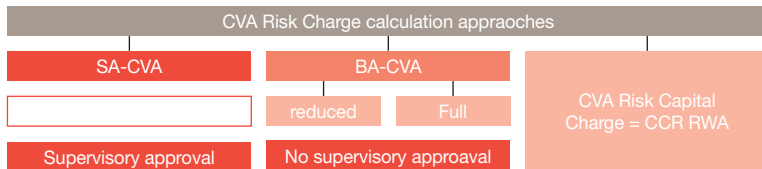
With the finalization of the CVA Risk Capital Charge Regulatory Framework, it is now clear that the Basel Committee on Banking Supervision envisages to determine the own funds requirements for CVA risks using the standard approach “SA-CVA” or the basic CVA approach “BA-CVA“. The BA-CVA approach is an extension of the current standard approach in the CRR. In addition to providing the SA-CVA and BA-CVA, the Basel Committee decided to introduce a materiality threshold based on proportionality into the finalized CVA framework. As a result, institutions with a derivative portfolio of up to € 100 bn may refrain from calculating the CVA risk capital charge under the SA-CVA or the BA-CVA and instead use the risk-weighted exposure amount for counterparty credit risk as the CVA risk capital charge.

The Standardized Approach (SA-CVA) closely follows the sensitivity-based standard approach of the FRTB framework for market risk. Similarly, the SA-CVA requires internal modeling of sensitivities for given market risk factors and especially the counterparty credit spread. In that sense, the SA-CVA is de facto an internal model. The application of the SA-CVA approach is subject to the approval of the competent authority and has been linked to a set of qualitative requirements.

The BA-CVA distinguishes between a reduced version and a full version of the approach. The reduced version of the basic approach does not take into account hedge transactions. The reduced BA-CVA thus also follows the principle of proportionality and was designed with the intention of providing smaller banks, with no hedging portfolios, with an easier-to-implement approach. The banks themselves can choose which version of the BA-CVA to use.

Further details of the SA-CVA and BA-CVA can be found on the following pages.

Fig. 18 Revised CVA framework



In order to apply the SA-CVA, three minimum criteria must be met:

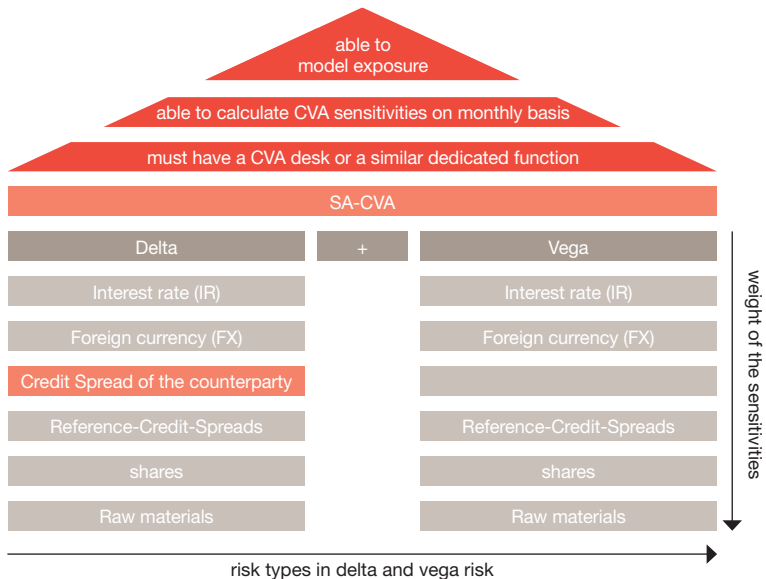
- A bank must be able to model exposure;
- calculate, on at least a monthly basis, CVA and CVA sensitivities to the market risk factors; and
- have a CVA desk (or a similar dedicated function) responsible for risk management and hedging of CVA.

The SA-CVA approach is closely based on the sensitivity-based approach of the FRTB framework. Similarly, the SA-CVA approach identifies sensitivities for the aggregated CVA book as well as for CVA hedges versus risk factors that are prescribed by the supervisor for the classical risk types of market risk. Unlike the counterpart from the FRTB framework, the SA-CVA approach is designed to determine a CVA regulatory capital requirement solely for delta and vega risks. Default and curvature risks are not taken into account.

Except for the counterparty credit spread risk type, which is only taken into account within the delta risk, the following risk types are decisive for both the delta and vega risk: interest rate, FX, credit spread of the reference asset, equities as well as commodities.

With this design of the SA-CVA approach, the supervisor does justice to the fact that the credit spread of a counterparty represents a linear risk for which the determination of vega risk is not appropriate. Irrespective of this, CVA sensitivities of vega risk are invariably material and must be calculated even if the portfolio of a bank does not contain any options.

Fig. 19 SA-CVA at a glance



Within the SA-CVA approach, determining the CVA sensitivities is the most important pillar for determining the regulatory CVA capital requirement or the so-called CVA risk capital charge in accordance with the sensitivity-based approach. After determining the sensitivities for the risk factors and risk types by using supervisory prudential formulas, other regulatory parameters and numerous qualitative requirements, they will ultimately flow into the regulatory *CVA Risk Capital Charge* of an institution. Institutions are required to use those sensitivities that are determined in the front office or for the accounting CVA. Furthermore, only risk-neutral calibrations of drift parameters are permitted. A historical calibration is not allowed.

A key role in the SA-CVA approach is the formula for determining the capital requirement K_b . This is the first granular aggregate of the CVA Risk Capital Charge, which determines the capital requirement at a given “bucket level” (for example, individual currencies). Significant input parameters are prescribed such as regulatory correlations and risk weights. Furthermore, the regulatory control parameter R with a fixed value of 0.01 has a specific influence on the extent of hedging effects within the calculations and ensures that no complete netting due to hedging benefits is possible. The individual aggregates of the capital requirement

at the bucket level are then finally calculated, taking into account a multiplier (m_{CVA}) of 1.25 as well as additional regulatory correlations (γ) for the capital requirement K for each risk type.

See the formulas for determining the capital requirement under the SA-CVA approach here:

$$K_b = 0,25 \cdot \sqrt{[\sum_{k \in b} WS_k^2 + \sum_{k \in b} \sum_{l \in b; l \neq k} \rho_{kl} \cdot WS_k \cdot WS_l] + R \cdot \sum_{k \in b} [(WS_k^{Hdg})^2]}$$

$$K = m_{CVA} \cdot \sqrt{\sum_b K_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} \cdot K_b \cdot K_c}$$

The weighted sensitivities WS_k and WS_k^{Hdg} for each risk factor k are obtained by multiplying the net sensitivities S_k^{CVA} and S_k^{Hdg} by the corresponding risk weight RW_k . Incidentally, the following parameters are relevant:

R = hedging disallowance parameter, set at 0.01

Y_{bc} = correlation parameters

K = risk factor

m_{CVA} = multiplier

The Basel Committee has designed a reduced and full version of the BA-CVA approach for its finalized framework on the CVA Risk Capital Charge, following the trend of proportionality that bank supervisors have recently put on the agenda when it comes to developing banking regulatory requirements. The reduced version ignores hedging benefits and is intended to provide a simplified implementation for smaller banks that do not hedge their CVA risk. The comprehensive version of the BA-CVA is intended for banks that hedge their CVA risk. Permitted hedges within the full BA-CVA are single-name CDS, single-name contingent CDS and index CDS – this is a further development compared to the current CVA framework. In the course of the revision of the BA-CVA, individual parameters have been recalibrated and individual adjustments in the formula-based operation of the BA-CVA have been made to reflect feedback from the industry.

Significant change for institutions with unhedged CVA portfolios include the consideration of exposure-variability in capital requirements for CVA risk foreseen in the consultation has been eliminated; for institutions with hedged CVA risks, this component is reduced. The full version of the BA-CVA complements the formula approach of the reduced version with a hedging component.

See here how the BA-CVA was constructed in a reduced and full version and how the reduced and full version intertwines:

$$K_{full} = \beta * K_{reduced} + (1 - \beta) * K_{hedged}$$

$$K_{reduced} = \sqrt{\left(\rho * \sum_c SCVA_c\right)^2 + (1 - \rho^2) * \sum_c SCVA_c^2}$$

$$K_{hedged} = \sqrt{\left(\rho * \sum_c (SCVA_c - SNH_c) - IH\right)^2 + (1 - \rho^2) * \sum_c (SCVA_c - SNH_c)^2 + \sum_c HMA_c}$$

} Reduced
BA-CVA

} Full
BA-CVA

SCVA = Stand-alone CVA; ρ = monitoring correlation parameter. 50%; $\beta = 0.25$ and monitoring parameter to provide a lower limit; SNH_c = parameter that gives recognition to the reduction in CVA risk of the counterparty c arising from the bank's use of single-name hedges of credit spread risk; IH = parameter that gives recognition to the reduction in CVA risk across all counterparties arising from the bank's use of index hedges; HMA_c = hedging misalignment parameter which is designed to limit the extent to which indirect hedges can reduce capital requirements given that they will not fully offset movements in a counterparty's credit spread.

Similar to its predecessor from the consultation (BCBS 325), the finalized BA-CVA approach is based on a system for applying regulatory risk weights, which, depending on sectors, lead to input parameters in given formulas. The risk weights are taken from a quantitative impact study conducted in 2015.

The risk weights differentiate between investment grade (IG), high yield (HY) and non-rated (NR) as well as different sectors. In the finalised framework, risk weights have been supplemented by another bucket “Other sector“:

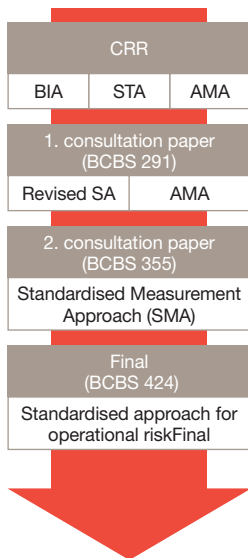
Tab. 1 BA-CVA risk weights

Sector of counterparty ¹	Credit quality of counterparty	
	IG	HY und NR
Sovereigns including central banks, multilateral development banks	0.5%	3.0%
Local government, government-backed non-financials, education and public administration	1.0%	4.0%
Financials including government-backed financials	5.0%	12.0%
Basic materials, energy, industrials, agriculture, manufacturing, mining and quarrying	3.0%	7.0%
Consumer goods and services, transportation and storage, administrative and support service activities	3.0%	8.5%
Technology, telecommunications	2.0%	5.5%
Health care, utilities, professional and technical activities	1.5%	5.0%
Other sector	5.0%	12.0%

¹ adopted from option 1 of the QIS as of 12/31/15

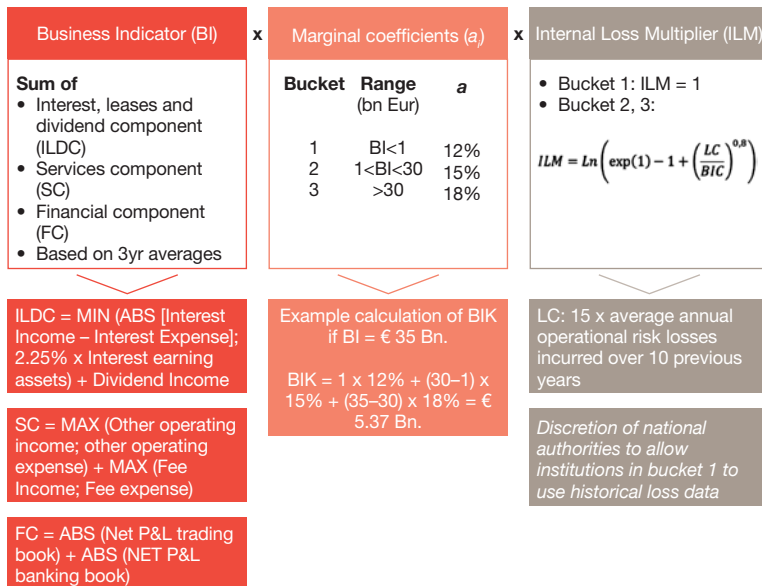
Standardised Approach for Operational Risk

Fig. 20 Development of OpRisk approaches



- Weaknesses identified in current approaches motivate the Basel Committee to develop a new method for the calculation of OpRisk capital requirements
 - First consultation paper proposes to align both current non-internal model methods (BIS, STA) into a single standardised approach while retaining the AMA
 - Deletion of advanced measurement approaches (AMA)
 - Inclusion of internal loss data in the standardised measurement approach (SMA) to align fears of AMA banks
- New standardised approach for operational risk, based on the concept of the business indicator (BI) introduced in the first consultation paper and using the BI to assign banks to one of three buckets.
 - Number of buckets is reduced from five to three
 - Changes to the calculation formulas of the second consultation paper (i.a. higher impact of fee and commission income, reduced factor for interest bearing assets, changes to calculation of averages of net positions)
 - Qualitative requirements for the collection of loss data and corresponding disclosure requirements

Fig. 21 OpRisk capital requirements



Discussion paper on Sovereign Risk

Fig. 22 Current and proposed treatment of sovereign risk

Categories	Leverage ratio	Liquidity	Capital Requirements	Credit Risk Mitigation Framework
Current Treatment	<p data-bbox="205 267 369 319">Leverage Ratio Framework</p> <ul data-bbox="147 373 358 425" style="list-style-type: none"> • Inclusion of sov. exposures 	<p data-bbox="506 280 714 301">Liquidity Standards</p> <ul data-bbox="467 373 736 456" style="list-style-type: none"> • National discretion – no limitation on use as high-quality asset 	<p data-bbox="875 280 991 301">Credit Risk</p> <ul data-bbox="792 373 1064 508" style="list-style-type: none"> • SA: ratings-based look-up table, national discretion for domestic sov. exposures • IRBA: 0.03% PD Floor 	<ul data-bbox="1113 373 1391 477" style="list-style-type: none"> • National discretion for zero haircut for repo-style sov. transactions
Proposed Treatment	<ul data-bbox="147 609 311 629" style="list-style-type: none"> • No changes 	<ul data-bbox="467 609 631 629" style="list-style-type: none"> • No changes 	<ul data-bbox="792 609 1064 743" style="list-style-type: none"> • Standardised risk weights according new definitions, removal of national discretion • IRBA: removed 	<ul data-bbox="1113 609 1391 660" style="list-style-type: none"> • Removal of national discretion zero haircut

Market Risk

- **SA:** national discretion for preferential default risk
- **Internal Models:** sov. exposures are included in (default risk) models

- **No changes**

Large exposures

- ### Concentration Risk
- **Exemption** of sov. exposures in large exposures framework

- Non-central governmental entities subject to 25% **Tier 1 exposures limit**
- **Marginal risk weight add-on** certain exp.

Pillar 2/3

- ### Pillar 2 Guidance/ Pillar 3 Disclosures
- **Pillar 2 guidance:** only general inclusion in stress testing
 - **Pillar 3 disclosures:** disclosure of amounts and RWA.

- **Pillar 2 guidance** on monitoring sov. exp. risks, incl. in scenarios for stress testing
- **Pillar 3 disclosures:** sov. exp. classified by risk weight, jurisdiction, accounting etc.



Motivation BCBS



Sov. exposures are not risk free: international inconsistency in risks & treatment



- More consistency, less national discretion
- More SA, removal of IRBA
- Reduction sovereign-bank nexus

Fig. 23 Proposed treatment of sovereign risk

Removal IRBA

- Inability to robustly model risk parameters of sov. exposures due to rarity of sovereign defaults
- Replacement by suitable SA that accounts for impact on current Capital Requirements

Standard approach

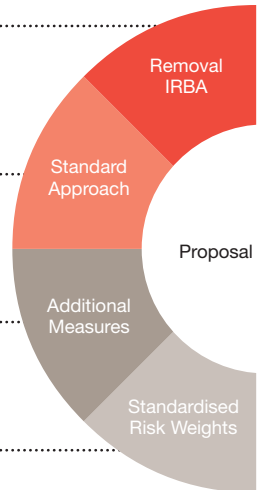
- Clear definitions of sovereign exposures (central bank, central government, other sovereign entities)
- Separation of domestic vs. foreign-currency sov. Exposures

Additional measures

- Due diligence required; use of additional indicators for creditworthiness of sov. exposure to determine risk of unrated exposures

Standardised Risk Weights

- One option: look-up table
- Possibilities for additional categories, approaches etc.

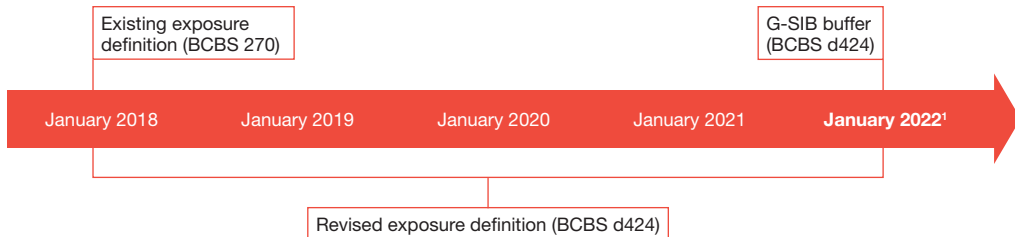


External rating	AAA to A- 0-2	BBB+ to BBB- 3	Below BBB- and unrated 4-7 and no classification
Central bank exposures ¹		0%	
Domestic currency central government exposures ¹	(0-3)%	(4-6)%	(7-9)%
Foreign currency central government exposures ¹	10%	50%	100%
Other sovereign entities ¹	25%	50%	100%

¹ calibration risk weights as illustration

Changes to the Leverage Ratio

Fig. 24 Introduction of the Leverage Ratio



¹ Jurisdictions are free to apply the revised definition of the exposure measure at an earlier date than 1 January 2022

Fig. 25 Changes to the LR in detail

Revised exposure measure (BCBS d424)

$$\frac{\text{Tier 1 capital}}{\text{Exposure measure}} > 3\%$$

- Introduction of binding minimum requirements
- Several changes as compared to BCBS 270 (i.a. implementation of a modified version of the SA-CCR for derivatives, cash pooling, trade date vs. settlement date accounting, updating the treatment of off-balance sheet exposures to ensure consistency with the SA ...)
- Additional exceptions for public lending and pass-through loans
- Jurisdictions may exercise national discretion in periods of exceptional macroeconomic circumstances to exempt central bank reserves from the LR → jurisdictions required to recalibrate the minimum LR requirement commensurately to offset the impact and require the banks to disclose the impact of this exemption

G-SIB buffer (BCBS d424)

$$\frac{\text{Tier 1 capital}}{\text{Exposure measure}} > 3\% + \text{buffer}$$

- G-SIB buffer must be met with Tier 1 and is set at 50% of a G-SIB's risk-based capital buffer
- G-SIB buffer will be divided into five ranges
- Capital distribution constraints will be imposed on a G-SIB that does not meet its LR buffer and/or its CET1 risk-weighted ratio
- If one of these requirements is not met → subject to the associated minimum capital conservation requirement (expressed as a percentage of earnings)
- If both requirements are not met → subject to the higher of the two associated conservation requirements

Overview of Basel IV topics finalised before December 2017

Fig. 26 Other Basel IV topics (1/2)

FRTB

Material weaknesses of the current approaches...

- Trading book – banking book boundary
- Treatment of credit risk in the trading book
- Weaknesses of VaR approach
- Hedging and diversification
- Liquidity of trading book positions
- Transparency and comparability of RWA

1

Banking book/trading book boundary

2

New Standardised approach increases risk sensitivity of RWA calculation

3

Internal Model Method using ES instead of VaR

SA-CCR

Calculation of EAD using SA-CCR
 $EAD_{SA-CCR} = \alpha \times (RC + \text{Multiplier} \times \text{AddOn})$

Alpha

- Supervisory factor
Alpha = 1.4

Replacement Cost

- Current replacement costs
- Calculation depending on collateralised/uncollateralised transactions
- Considering parameters of collateral agreements for secured transactions

Multiplier

- Accounts for over-collateralization and negative mark to market
- Reduces add-on in these cases

Add On

- Potential future increase of current exposure
- Depends on volatility of the underlying

PFE

Securitisations

Hierarchy of new approaches:

SEC-Internal Ratings Based Approach

SEC-External Ratings Based Approach

SEC-Standardised Approach

New criteria for STC securitisations:

- Criteria for simple, transparent and comparable securitisations
- To foster market in securitisations by providing safeguards to investors
- Reduced risk weights for securitisations fulfilling the STC criteria

Fig. 27 Other Basel IV topics (2/2)

Investment Funds	Step-in Risk	Disclosure
<ul style="list-style-type: none">• Three approaches:<ul style="list-style-type: none">– Look-through approach (LTA)– Mandate-based approach (MBA)– Fall-back approach (FBA)• Significant increase of risk weights in case of the FBA• Explicit treatment for leveraged funds• New rules on calculating capital requirements for derivatives	<ul style="list-style-type: none">• Guidelines for the identification and management of step-in risk• Step-in risk results from non contractual obligations not covered by consolidation or RWA calculation• Banks are required to identify and manage step-in risks, however no pillar I capital treatment is envisaged	<ul style="list-style-type: none">• Revision of current disclosure requirements in three phases:• Increased comparability of disclosures through mandatory use of standardised templates• Increased frequency of disclosures with emphasis on semi-annual disclosure report• Increase in numbers to be disclosed, especially regarding reconciliation
Large Exposure	TLAC	IRRBB
<ul style="list-style-type: none">• First time publication of global standards for large exposures• Based mainly on current EU rules• LE limits to be based on Tier 1 instead of eligible own funds• Reduced LE limits for positions between G-SIBs• Changes regarding credit risk mitigation and off balance sheet positions	<ul style="list-style-type: none">• Requirements for liabilities that are eligible for a bail-in in case of restructuring or resolution• Minimum requirements for G-SIBs to hold RWA-based amount of TLAC• Deduction treatment for TLAC holdings in other G-SIBs• Reporting and disclosure requirements	<ul style="list-style-type: none">• Treatment of IRRBB remains part of pillar II, no minimum capital requirements under pillar I• Standardised approach formulated by BCBS that can be used as a backstop by banks or regulators• Backstop is based on six scenarios and their impact on the economic value of equity

Challenges & Solutions

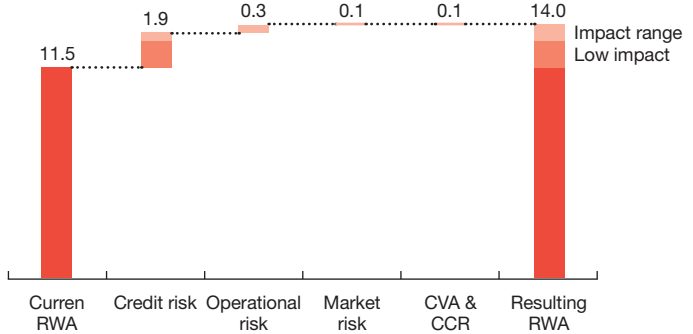
Expected Impact on the European Banking Industry ...

The Basel IV reforms lead to an aggregate expected increase in RWA of €1.0 trillion to €2.5 trillion, or a rise of 13% to 22% for the largest banks in Europe. The biggest European banks will face a substantial impact, with an expected average RWA impact of up to 73%.

Fig. 28 Impact of Basel IV

Aggregated RWA impact estimate in € trillion

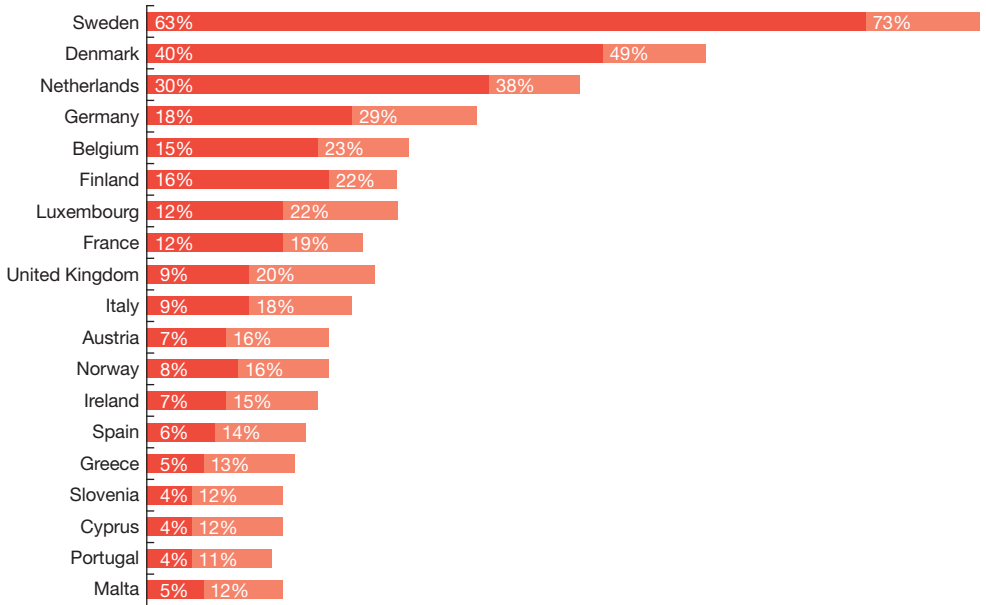
High impact	20%	30%	30%	50%	22%
Low impact	15%	0%	0%	0%	13%



... and country by country

As expected, the effects of Basel IV are concentrated in credit risk and are significantly driven by the output floor, with northern European countries most heavily affected, headed by Sweden. On an overall level, other (smaller) banks – including those with little in terms of IRB portfolios – may benefit from Basel IV and see a reduction in RWA. These banks might step in where other banks, experiencing more significant impacts, pull out.

Fig. 29 Expected average RWA impact relative to current RWA

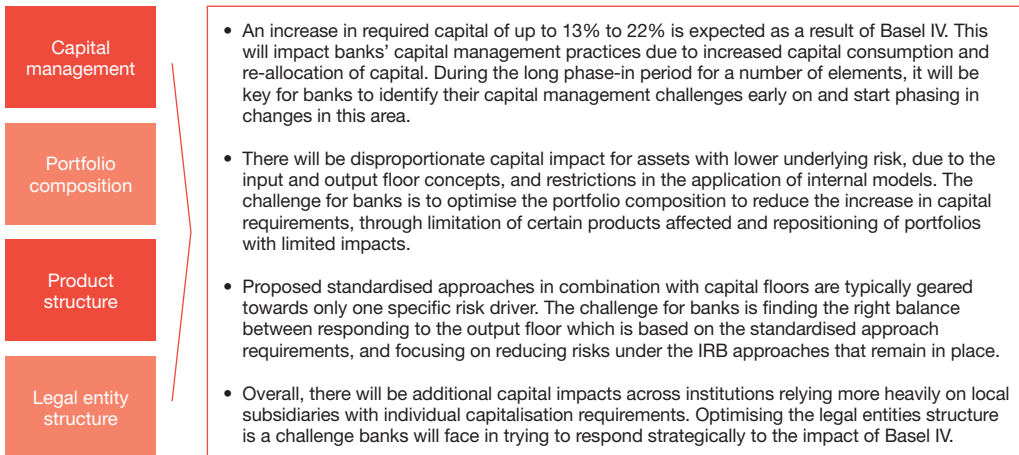


■ Min expected impact ■ Impact range

Four levers that need to be pulled

Regardless of the impact, all banks will need to prepare for Basel IV. Generally, the challenges for banks in terms of strategic responses to the impacts can be grouped around four levers: capital management, portfolio composition, product structure, and legal entity structure.

Fig. 30 Strategic responses to Basel IV



At a glance: Basel IV challenges

1

Business models, risk and business strategy have to be adjusted. Changes in almost all approaches to RWA calculation. A general increase in RWA in all risk types is to be expected.

2

The complexity of the new standardised approaches increases; creating extensive new data requirements and increased computational power for more complex calculations.

3

Internal model banks face the necessity to implement the standardised approaches as well as the revised internal model approaches. And to do so in a most optimised way.

4

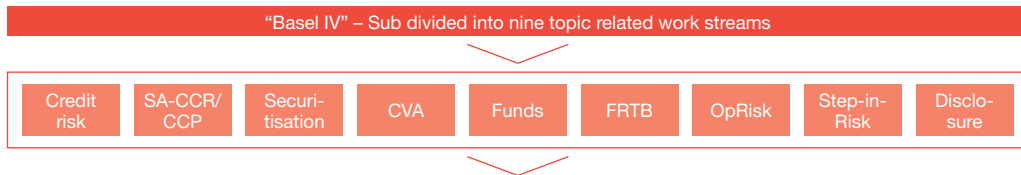
Due to the capital floors, overall capital requirements will depend on the implementation of the standardised approaches, not on the optimisation of internal models.

5

Even though 2022 looks like a long way to go, banks have to start right now to analyse the impact on their business in order to adjust in time before the new rules come into effect.

Solutions: which Steps to take next

Fig. 31 Performing a Basel IV impact assessment in four simple steps



Each of the nine topic related work streams are assessed and based on a four stage approach:

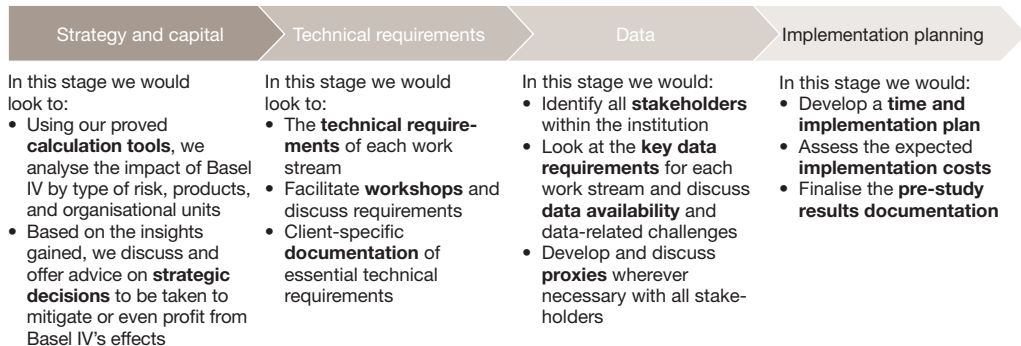
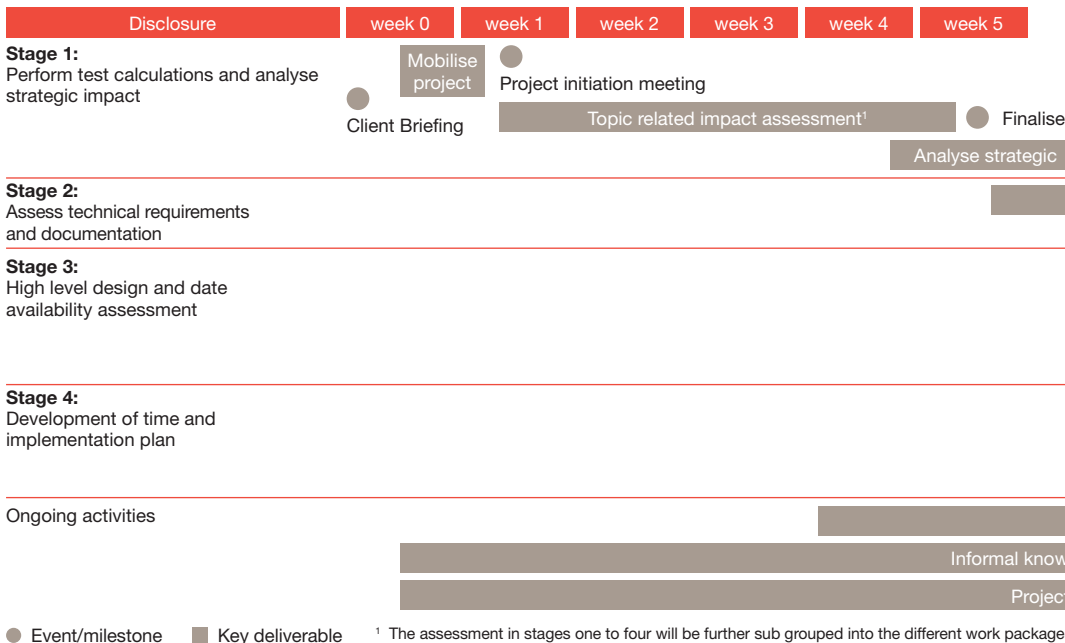


Fig. 32 Indicative timetable for the Basel IV impact assessment



week 6

week 7

week 8

week 9

week 10

week 11

week 12

week 13

week 14

impact assessment

impact

Final impact assessment

Technical requirements and documentation¹

Work plan

Data availability assessment¹

Conduct workshops

Identify stakeholders

Review options with stakeholders

Sign off assumptions

Development time and implementation plan

Final deliverable

Concluding workshop

Stakeholder engagement and communications

Knowledge transfer/Capability building in advance of implementation

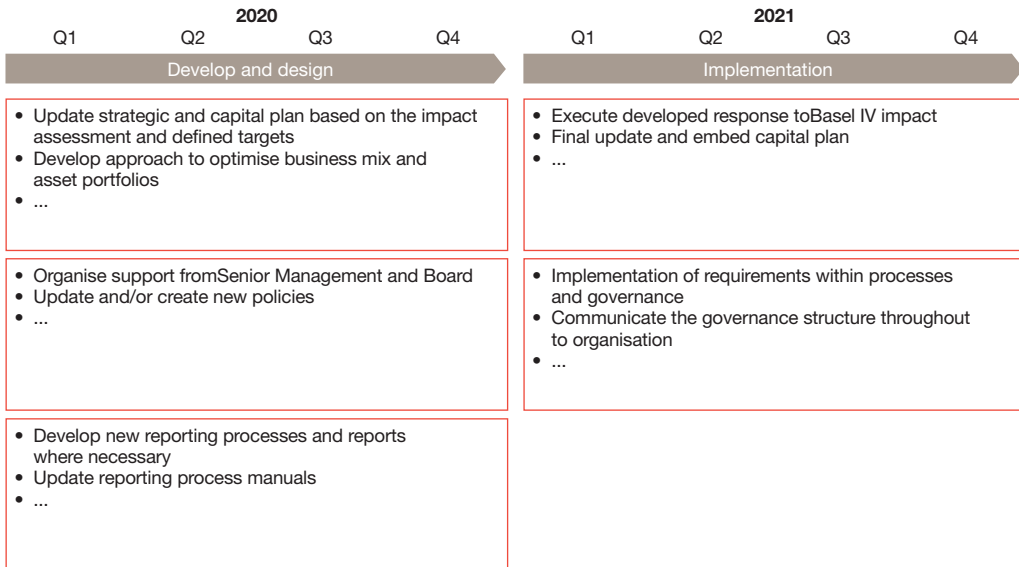
Project management, progress reporting to steering committee

Details (Basel IV topics). Details are described on the technical descriptions for each work package.

Indicative timetable for implementation

Fig. 33 Basel IV Implementation: get ready for 2022

		2019		
		Q2	Q3	Q4
Q1	Mobilisation	Assess and define		
<ul style="list-style-type: none"> • Take stock QISs • Set up and agree governance, including local territory/BU • Mobilise central team • Define scope and develop detailed project plan • Identify inter-dependencies, including linking to FRTB • Define key stakeholders and obtain sign-off • Mobilise and setup BU teams • Develop project monitoring dashboard 	Phase			
	Capital impact	<ul style="list-style-type: none"> • Update QISs • Assess impact on 3–5 year strategic plan and capital plan • ... 		
	Strategic and business implications			
	Governance	<ul style="list-style-type: none"> • Technical interpretation of standards • Policies gap analysis • ... 		
	Policies			
IT and data	<ul style="list-style-type: none"> • Data gap analysis • Data quality assessment • ... 			
Reporting				

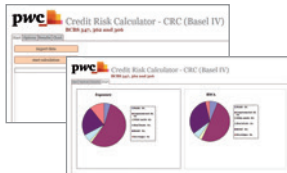


Solutions: how PwC can support you

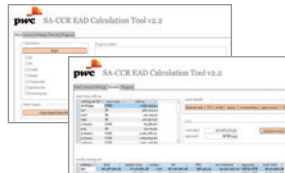
Now that the Basel Committee provided transparency on how the revised approaches look like, it is time for you to have certainty on the impact for your institution!

Use PwC's tested Basel IV calculator tools – already up to date on the latest developments

Based on final Basel IV rules Credit Risk Calculator (CRC)



SA-CCR /CVA tool



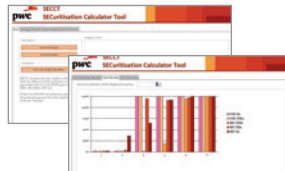
OpRisk tool



Based on CRR II draft FRTB (SBA) tool



SECCT securitisation tool



Our Services

Our Expertise

Whether regarding the Basel Committee, EU-regulation or national legislation – we use our established know-how of the analysis and implementation of new supervisory regulation to provide our clients with high-quality services. Embedded into the international PwC network, we have access to the extensive knowledge of our experts around the world.

PwC can draw on long lasting experience of implementing new regulatory requirements by supporting a number of banks in completing quantitative impact studies prior to the implementation of Basel II and Basel III and by the functional and technical implementation of the final regulations.

About us

PwC helps organisations and individuals create the value they're looking for. We're a network of firms in 158 countries with more than 236,000 people who are committed to delivering quality in assurance, tax and advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com. Learn more about PwC by following us online: @PwC_LL, YouTube, LinkedIn, Facebook and Google+.

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PwC Materials

Dedicated PwC Basel IV Webpage:

www.pwc.com/gx/en/services/advisory/basel-iv.html

Dedicated PwC Basel IV channel – The channel is a new medium to give you a periodical overview on current topics around Basel IV. It comprises a series of online lectures supported by slides:

www.youtube.com/channel/UCosEew32vLFgApuGR048bBg

Register for the Basel IV channel:

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