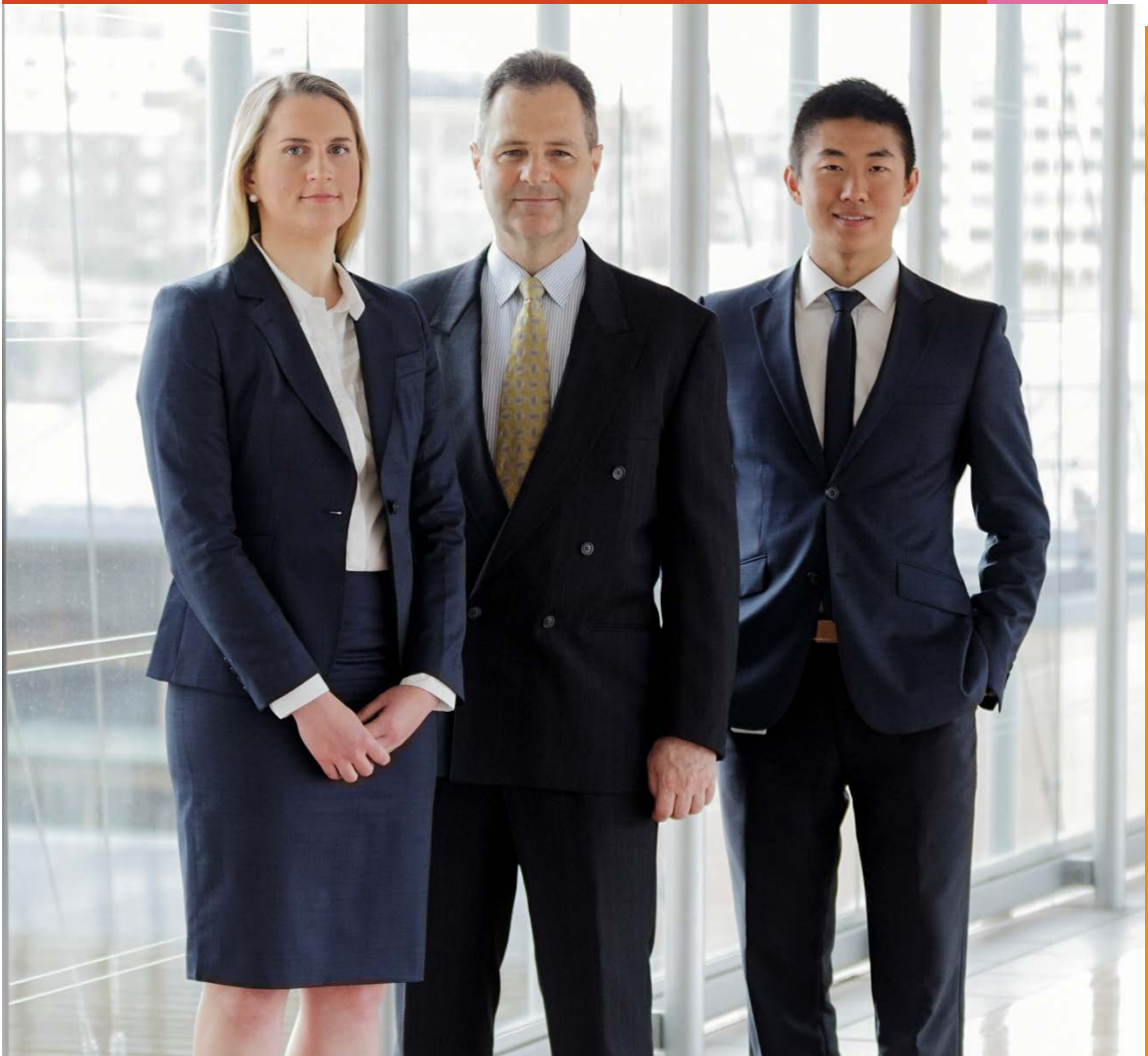


Basel III monitoring and Basel IV impact analysis – Are you prepared?

PwC tools make the difference

*How PwC
tools support
you in
meeting the
challenges of
(ad hoc)
regulatory
data
collections
and impact
analysis
July 2018*



The implementation of Basel IV leads to even more extensive data requirements for Basel monitoring exercises and quantitative impact studies

Since 2011, the Basel Committee for Banking Supervision (BCBS) is running Basel III quantitative impact studies (QIS) on a regular basis. The requirements given by regulatory QIS methodologies are remarkable. In particular, data availability related requirements are calling for a preparation on an early stage within the banking sector. Besides Basel III,

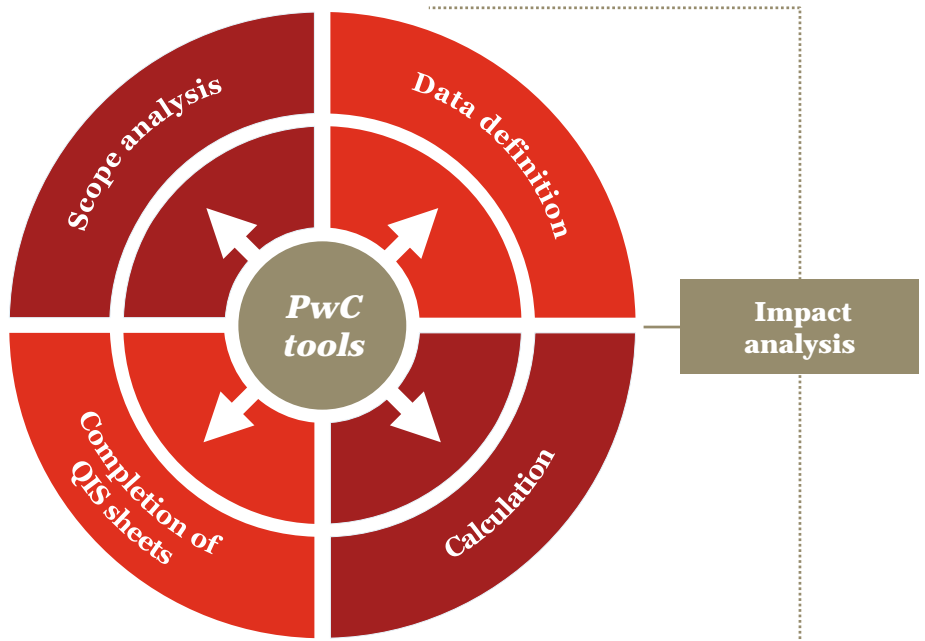
the upcoming QIS assessment (starting in August 2018) builds on brand new Basel IV requirements.

QIS 2018	CR SA	CR IRB	Market risk	OpRisk	Liquidity
	SA-CCR	Securitisation	Output floor	CVA risk charge	Other

The final implementation of supervisory rules into binding law will be linked to QIS results submitted by banks to their supervisors. It is now up to the banking sector to participate and to reflect challenging impacts arising from upcoming supervisory Basel III- and Basel IV frameworks in order to assure a proportionate implementation of binding regulatory requirements across the sector.

PwC has pre-developed a range of quantitative tools to support your bank in meeting supervisory QIS requirements in an efficient, effective and sustainable manner. See the features of these tools on the following pages.

PwC's calculation tools for all quantitative Basel IV frameworks support you in the context of scope, data, calculation, QIS completion and impact analysis...



The new standardised approach for credit risk (BCBS 424)

The Basel Committee published the much-anticipated paper on credit risk including the floor requirements in 2017. Because of the floor rules, the standardised credit risk approach is relevant even for IRB banks.

PwC has many years of experience with pillar 1 credit risk from consulting projects, QIS studies and audit projects. We used this experience to develop a tool,

which can help you to understand, what are the effects of the new standardised approach including the IRB-floor rules.

We propose a straightforward 3-step approach to the calculation process:

Step 1 – Data requirements via standard template

- The PwC CRC tool can calculate the capital requirements from standardised credit risk approach including credit risk mitigation.
- The tool uses a flexible standard interface that is based on regulatory reporting software (for example ABACUS or BAIS).
- The input format is primarily based on the actual reporting templates. Consequently, that will reduce the amount of time required for pre-processing. Only a few more (but important) elements will be needed.
- CRR scope as well as Basel scope can be calculated simultaneously (comparison possible in Basel QIS).

Step 2 – Calculation of RWA

- Automatic calculation of the RWA regarding the new credit risk standardised and internal ratings based approach.
- MS Access allows for a stable and fast processing of data.
- You can simulate different scenarios (for example use of external rating) and determine the IRB floor impact.

Step 3 – Results

Exposure Class	RWA CRR	RWA Basel 4
Corporates incl. SL - SA	1.531.200,00 €	0,00 €
Equity - IRBA	100.000,00 €	0,00 €
Equity - SA	50.000,00 €	375.000,00 €
Real Estate - SA	4.900.000,00 €	3.900.000,00 €
Retail - IRBA	1.065.000,00 €	0,00 €
Retail - SA	1.793.750,00 €	1.233.750,00 €
SL - IRBA	3.200.000,00 €	0,00 €

RWA results on aggregate level			
RWA	9.963.250,00 €	RWA SA	11.353.250,00 €
Ratio	87,76%		

Basel III Monitoring

Basel III Monitoring

You can get your information needed for the Basel III Monitoring sheets.

CRSA and IRBA impact

Credit Risk Standardised Approach and IRBA

You can see the direct impact on your RWA and you can adjust your portfolios if necessary.

Results

IRB-Floor

You can calculate the floor requirements for your IRB models and evaluate the impact on your capital ratios.

Floor

Scenarios

You can run different scenarios and evaluate the impact for different regulatory decisions (for example use of external rating).

Scenarios

Find gaps

You can find gaps in your IT/datapoint landscape for example missing LTV values in the reporting system.

Find gaps

The new IRB credit risk approach ('Future of IRB')

The Future of IRB initiative comprises a number of changes to internal models introduced by the Basel Committee, the EBA and the ECB. Basel IV introduces reductions in scope of internal models, limits to parameter estimation practices, new and/or increased input floors, as well as the capital output floor. The EBA has published a number of regulatory documents

outlining new technical approaches to default identification and model development. The ECB is performing on-site reviews of internal models to ensure that these changes are properly implemented.

Combined, this poses a significant challenge for banks, both from an increase in RWA and from implementation issues.

Regulatory scope		Key messages
Basel IV	<ul style="list-style-type: none"> Revision of PD and LGD parameter floors. Reduced application scope of AIRB approach. Output floor based on standardised approach RWA. 	<ul style="list-style-type: none"> Impact of regulatory changes should not be assessed in isolation since such an approach can lead to underestimation.
EBA – Definition of default	<ul style="list-style-type: none"> Introduction of consistent days-past-due counting approach. New guidelines on default identification (e.g. UTP triggers). Changes impact PD/LGD parameters, which affects IRB RWA, IFRS 9 ECL, IRB shortfall and CET1 capital ratios. 	
EBA – Guidelines on PD and LGD estimation	<ul style="list-style-type: none"> Detailed guidelines on PD and LGD estimation. Introduction of multiple LGD components and new approaches to modelling downturn LGD and EL_{BE}. Introduction of formal Margin of Conservatism framework. 	

Approach	
<p>Impact assessment steps</p> <ul style="list-style-type: none"> GAP analysis – Determine sources of potential impact. Data gathering – Collect data required for an impact assessment. Parameter estimation – Adjust historical data and estimate risk parameters according to new requirements. Impact assessment – Assess impact on RWA, ECL and CET1 capital. 	<p>Tools</p> <p>Impact assessment instruments with automated calculation procedures and built-in reporting features.</p>

Results of assessment																																																																																																											
<p>Deliverables</p> <ol style="list-style-type: none"> Summary presentations with results of impact analysis and recommendations. Reports with decomposition analysis, showing the underlying reasons for the impact (e.g. specific models, sub-portfolios or regulatory changes). Sensitivity analysis, showing impact on RWA/P&L/CET1 capital under various scenarios. Detailed reports describing the assessment methodology. SAS/R codes used for impact assessment. 	<p>Sample reporting outputs</p> <p>Impact on RWA under various scenarios</p> <table border="1"> <thead> <tr> <th rowspan="2">Scenario Description</th> <th colspan="4">JIRA</th> <th colspan="4">Standardised</th> </tr> <tr> <th>COMP</th> <th>COMP SWE</th> <th>RET</th> <th>RET SWE</th> <th>BANK</th> <th>COMP</th> <th>RET</th> <th>SDV</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>1 Base scenario</td> <td>14.4%</td> <td>-0.8%</td> <td>-0.7%</td> <td>-21.2%</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>12.2%</td> </tr> <tr> <td>2</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>2.5%</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>12.5%</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>13.8%</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>16.5%</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>2.5%</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>16.2%</td> <td>4.3%</td> <td>5.0%</td> <td>13.8%</td> <td>16.5%</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Standardized portfolios</p> <table border="1"> <thead> <tr> <th>Portfolio</th> <th>Bank</th> <th>Corporate</th> <th>Retail</th> <th>Structured</th> <th>Total STA</th> </tr> </thead> <tbody> <tr> <td>Actual RWA (31-12-2017)</td> <td>148</td> <td>1,634</td> <td>1,757</td> <td>606</td> <td>4,145</td> </tr> <tr> <td>Expected impact (Base scenario)</td> <td>172</td> <td>1,757</td> <td>1,884</td> <td>720</td> <td>4,533</td> </tr> </tbody> </table>	Scenario Description	JIRA				Standardised				COMP	COMP SWE	RET	RET SWE	BANK	COMP	RET	SDV	TOTAL	1 Base scenario	14.4%	-0.8%	-0.7%	-21.2%	16.2%	4.3%	5.0%	13.8%	12.2%	2	16.2%	4.3%	5.0%	13.8%	2.5%					3	16.2%	4.3%	5.0%	13.8%	12.5%					4	16.2%	4.3%	5.0%	13.8%	13.8%					5	16.2%	4.3%	5.0%	13.8%	16.5%					6	16.2%	4.3%	5.0%	13.8%	2.5%					7	16.2%	4.3%	5.0%	13.8%	16.5%					Portfolio	Bank	Corporate	Retail	Structured	Total STA	Actual RWA (31-12-2017)	148	1,634	1,757	606	4,145	Expected impact (Base scenario)	172	1,757	1,884	720	4,533
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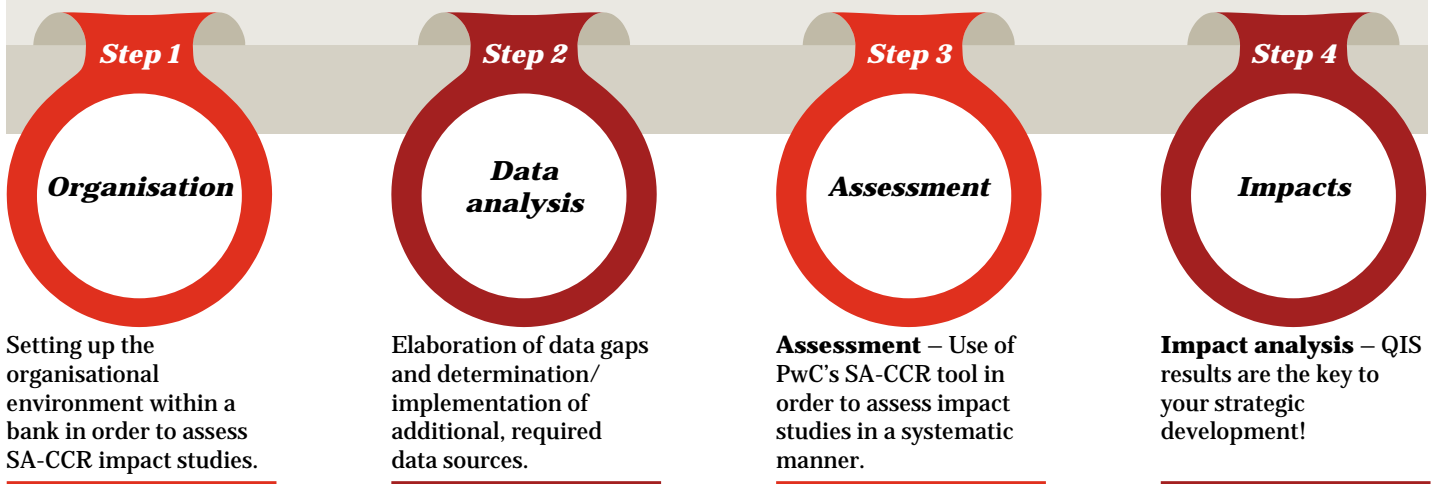
The SA-CCR's high degree of risk sensitivity can only be achieved within quantitative impact studies if the complex calculation process of the approach is met sufficiently...

SA-CCR – A highly risk-sensitive but complex approach for calculating capital requirements

The Basel Committee's new standardised approach for measuring counterparty credit risk exposures (SA-CCR) will play a major role within upcoming quantitative impact studies (QIS). From organisational issues to impact analysis, PwC's SA-CCR expert team has gained

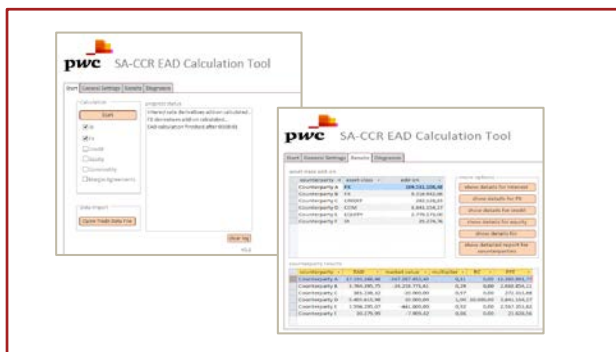
significant experience in the implementation of SA-CCR requirements so far and is familiar with the mechanisms of the approach in the context of risk-sensitivity and complexity.

PwC's comprehensive SA-CCR impact study approach builds on the following four steps:

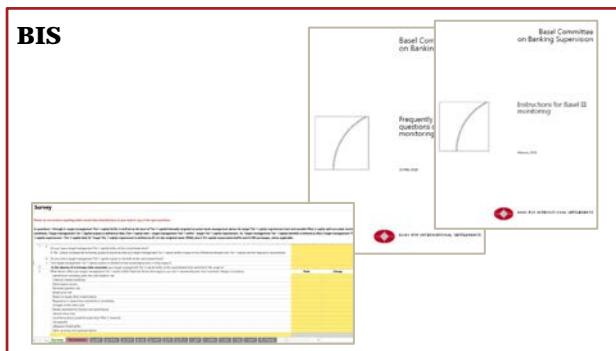


PwC's SA-CCR tool for your QIS assessment

PwC's access-based SA-CCR tool



Impact studies



Features of PwC's access-based SA-CCR tool

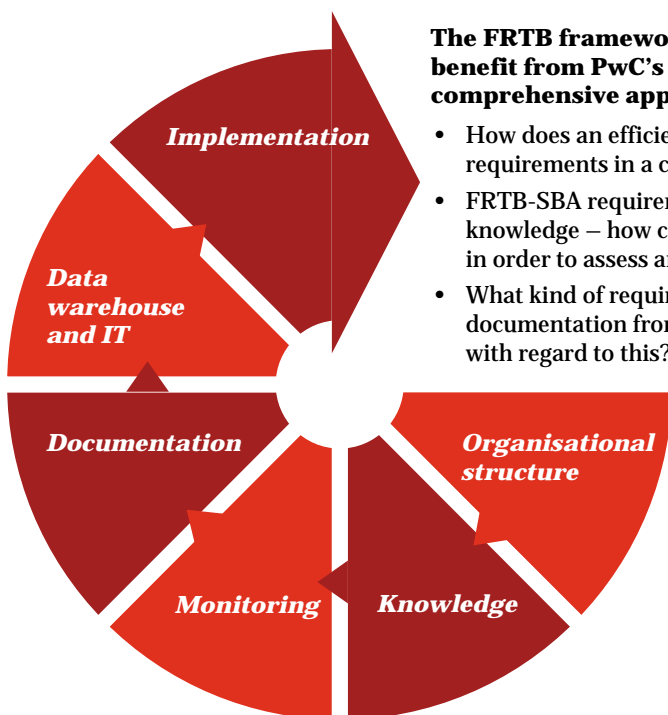
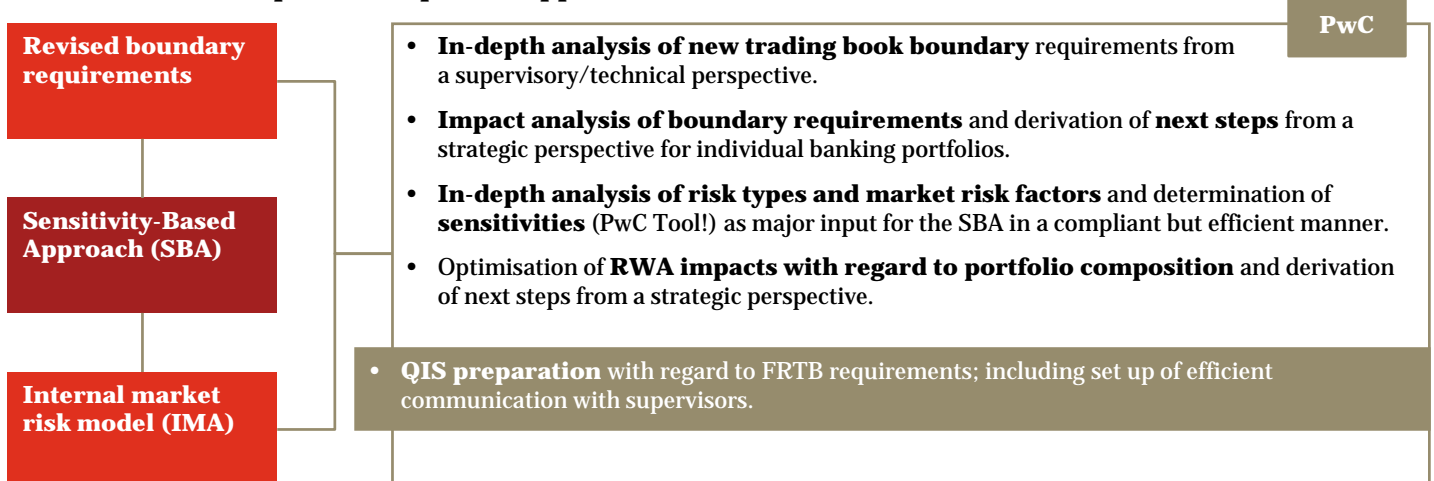
- ✓ EAD simulations and impact studies according to BCBS 279 and CRR II requirements.
- ✓ Dynamic and flexible in use, regardless of portfolio composition.
- ✓ Determination of EAD in a systematic and structured manner.
- ✓ Tool for flexible and strategic evaluation.
- ✓ Impact analysis considering collaterals and netting sets.
- ✓ Aggregation of derivatives into netting sets.
- ✓ Input sheets with pre-specified data requirements.

Demanding boundary requirements, new risk measures and sensitivities within FRTB – A coherent implementation of all aspects is indispensable

The revision of the supervisory framework for one of the most important risk types for banks, namely the market risk, has been (for the moment) finalised. Supervisors are set to challenge the banking sector in the context of quantitative impact studies in order to get an impression on how things stand regarding FRTB.

Is your bank prepared to meet ad hoc QIS requirements? See how PwC can support you with a variety of pre-developed tools to assure command and control of this challenge.

PwC is currently supporting major, global banking institutions in implementing/assessing key aspects of FRTB requirements. The following has been achieved so far within internationally assessed impact studies with the help of PwC's proven approach:



The FRTB framework affects various areas in your bank. See how your bank can benefit from PwC's insights and experiences. PwC's pre-developed comprehensive approach will help you to answer multiple important questions:

- How does an efficient organisational structure look like in order to meet FRTB **QIS** requirements in a compliant manner?
- FRTB-SBA requirements demand a huge level of quantitative, legal and supervisory knowledge – how can knowledge be transferred sufficiently within all affected departments in order to assess an ad-hoc **QIS**?
- What kind of requirements apply to FRTB monitoring processes and to corresponding documentation from a risk management perspective? What can you learn from your **QIS** with regard to this?

- How can a bank fulfil FRTB **QIS** requirements with its data warehouse and IT infrastructure in place? What needs to be done?
- What is the optimal **QIS** assessment process from a bank's individual perspective?
- How does a comprehensive and sustainable **QIS** process look like?

Be at the forefront and prepare the FRTB QIS assessment within your bank at an early stage. Get in touch with PwC's FRTB experts now.

New internal model approach for market risk

The revision of the Internal Model Approach has led to a variety of new quantitative and qualitative requirements. The Basel III monitoring exercise and the EBA QIS collects various data on the level of trading desks. This includes data on Value-at-Risk and Expected Shortfall. In addition, detailed figures on the P&L are required to allow for an in-depths look at back-testing and

P&L-attribution.

PwC has extensive experience supporting major banks in developing internal models for FRTB calculations and impact analysis.

We identified 4 key steps to complete the QIS successfully. PwC can support you in every step:

Step 1 – Gathering the required information

- Identification of the required data and the corresponding IT systems (e.g. Front office systems). Where data is only available with undue effort, pragmatic approximations are specified.
- Definition of the suitable functional and technical interfaces to obtain the data.
- Perform collection, reconciliation and quality assurance of the data.

Step 2 – Performing the calculation

- The calculation is performed in the bank's and/or PwC's system. Some of the beneficial features of the PwC's system:
 - A pricing library for both plain-vanilla and exotic derivatives which can be used to perform full-revaluation of positions.
 - A risk engine allowing for both historic VaR/ES simulation

and Delta-Gamma approximation.

Step 3 – Filling the quantitative templates

FRTB-IMA Capital requirements

A) IMA Expected Shortfall		Global trading book	GIRR
ES			
ES ₉₅			
ES _{10 days, 95}			
ES _{20 days, 95}			
ES _{40 days, 95}			
ES _{60 days, 95}			
ES _{120 days, 95}			
ES _{1c}			
ES _{10 days, 1c}			
ES _{20 days, 1c}			
ES _{40 days, 1c}			
ES _{60 days, 1c}			
ES _{120 days, 1c}			
ES _{1c}			
ES _{10 days, 1c}			
ES _{20 days, 1c}			
ES _{40 days, 1c}			
ES _{60 days, 1c}			
ES _{120 days, 1c}			

Strategic analysis/implications

1) Actual P&L				
Desk number	Description (name internally used)	Internal models permission	Hedging strategy (is this desk considered to be "well hedged"?)	T
Desk 1				
Desk 2				
Desk 3				
Desk 4				
Desk 5				
Desk 6				
Desk 7				
Desk 8				
Desk 9				
Desk 10				
Desk 11				

Step 4 – Answering qualitative questions

- The qualitative questions to be asked in the QIS can also be used to get a better understanding about your institutes own situation with respect to market risk management.
- PwC can be a valuable sparring-partner, e.g. in the field of:
 - Difference and reconciliation between risk-theoretical, hypothetical, and actual P&L.
 - Non-modellable risk factors.
 - Trading desk structure.

OpRisk – The reflection of interacting business indicator and historical loss data in the new standardised approach (OpRisk SA) requires rich and consistent data bases

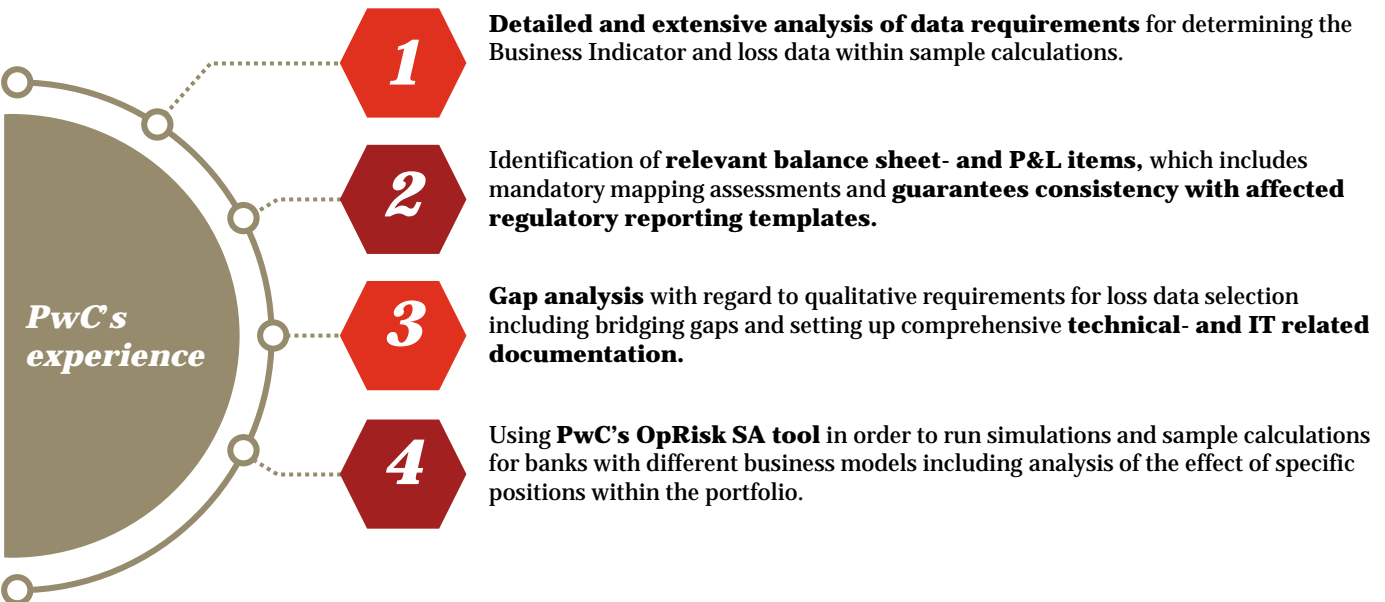
The new OpRisk SA builds on a sufficient interaction between Business Indicator and historical loss data.

Upcoming quantitative impact studies (QIS) that will be launched by regulators during 2018 will highlight

whether your bank is prepared to meet ad hoc QIS requirements regarding the new OpRisk rules.

PwC's pre-developed OpRisk SA tool will guide you through this exercise.

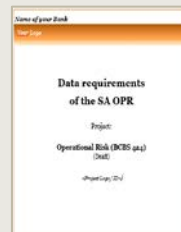
What PwC's global Basel IV expert team has achieved so far within regulatory OpRisk projects...



PwC's OpRisk SA tool

The new OpRisk SA affects a broad band of departments and areas within a bank's landscape. The major impact of OpRisk SA data requirements applies to the risk management, the accounting and regulatory reporting departments and to a bank's legal division.

Prepare your bank for upcoming impact studies and make beneficial use Of PwC's OpRisk SA tool...



What PwC brings along when assessing your impact studies

- PwC provides its flexible **OpRisk SA tool including input sheets** with data requirements according to the recent regulatory principles as defined by BCBS 424.
- PwC's **OpRisk SA tool for comprehensive simulation and analysis** purposes: what are the main drivers on regulatory OpRisk capital requirements?
- PwC's **OpRisk SA tool as a 'challenger'** for bank-internal organisational structures: Is your bank well prepared to meet regulatory OpRisk requirements when they are in force?
- Documentation of **QIS results** as the major milestone for the OpRisk SA implementation.

Securitisations according to the new securitisation framework (BCBS 374)

Since securitisations have been considered a primary factor contributing to the financial crisis started in 2007/2008, the BCBS intends to eliminate weaknesses in the applicable rules for RWA calculation and to

establish criteria to identify less complex securitisations, suitable for the development of a sustainable market and that shall receive lower risk weights.

Step 1 – Classification of securitisation according to the new approaches and the given hierarchy



Step 2 – Identification of Simple, Transparent and Comparable (STC) securitisations

STC Securitisations

Simple

- No active portfolio management.
- Homogeneity.
- No re-securitization.
- Non-defaulted positions.
- No 'originate to distribute' securitization.
- Cash flows do not significantly depend on sale of securities.

Transparent

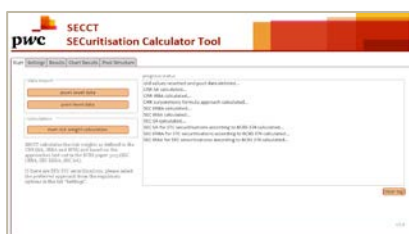
- Access to statistical/historical data (e.g. defaults, price developments), min. 5 years.
- External verification of the sample.
- Disclose liability-Cash-flow-Model before and after pricing to investors (ongoing).
- Transparency requirements for originator, sponsor, SPE.

Comparable

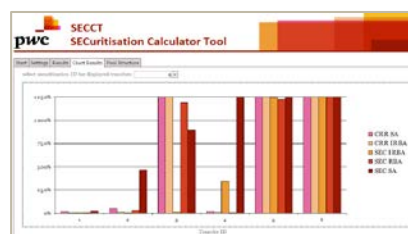
- Risk retention.
- Mitigation of non-credit risk (i.e. FX and interest rate risk).
- At-arm's length interest rates.
- Prepayment events in revolving structures.
- Definitions, remedies and actions relating to delinquency.
- Rules for conflict settlement.

Step 3 – Calculation and visualisation of the impact of the new basel securitisation framework with PwC SECCT

PwC SECCT – SECuritisation calculator tool



- Easy upload of mass data into a high performing MS Access application.
- Data processing within seconds.



- Automated calculation of risk weights according to the current and future securitisation framework.
- Transparent visualisation of the results.

PwC SECCT can be used for calculating the relevant QIS information and filling the templates as well as for internal impact studies, test and scenario calculations, or business analyses.

Basel IV workstream leaders

To help you calculating your data for Basel III monitoring and Basel IV data collections and to analyse the impacts, we have established a team of Basel IV experts across our network.

If you would like to discuss any of the content in this publication in greater depth, please speak to your usual PwC contact, or one of the following team members.

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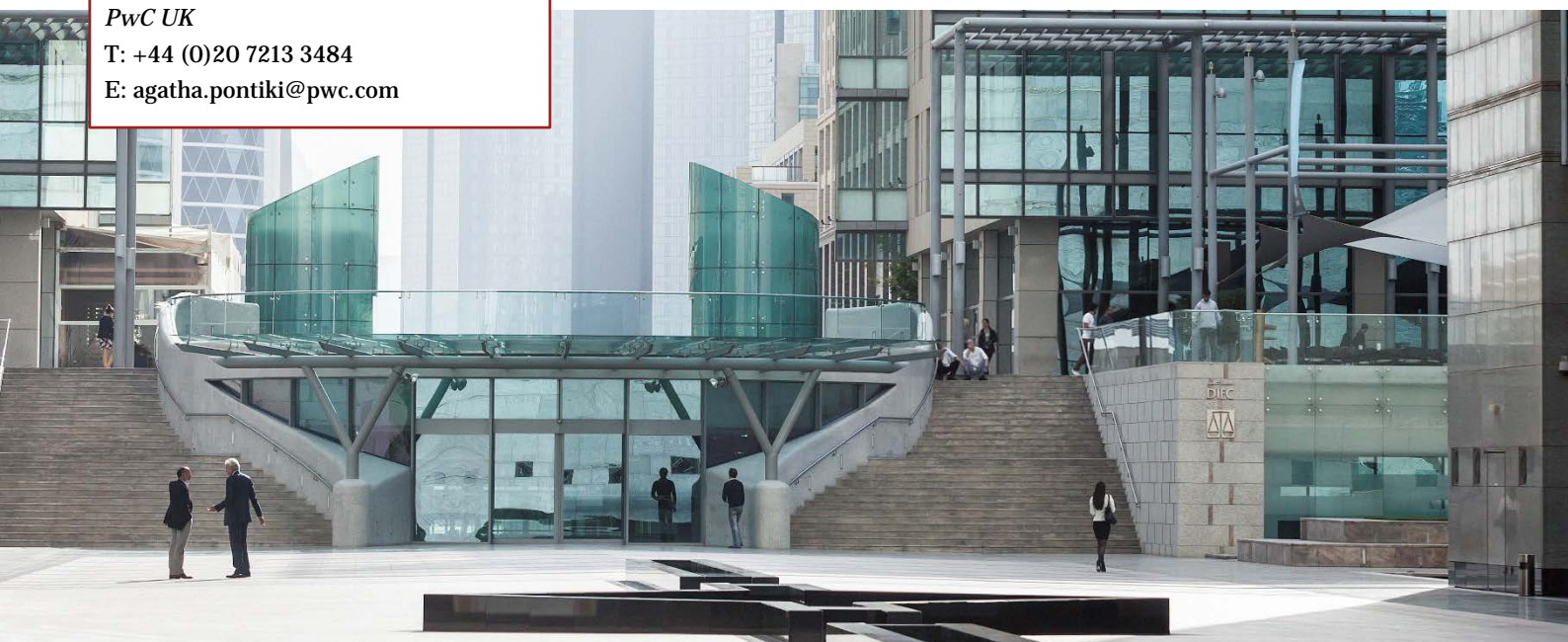
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PwC materials

- Dedicated PwC Basel IV Webpage – <https://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:
<https://www.youtube.com/channel/UCosEew32vLFgApuGR048bBg>
- Register for the Basel IV channel – <https://www.pwc.com/gx/en/services/advisory/basel-iv/register-basel-iv.html>

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