

ADAPTIV FRTB SOLUTION

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FRTB

The Basel Committee on Banking Supervision (BCBS) issued the final version of its Fundamental Review of the Trading Book (FRTB) regulations in January 2016. FRTB provides a new framework for calculating market risk capital and is without doubt the biggest upheaval of trading book market risk capital measurement since the 1990's. The framework requires vastly greater computations to be performed, better data management within the bank and results in far greater complexity of impacts. The framework is built around two main measurements: a new standardized approach featuring a sensitivity based calculation and an internal models approach based on a liquidity adjusted expected shortfall calculation.

FRTB Challenges

The new FRTB regulations provide several challenges:

1. Capital Impact

Results from FRTB quantitative impact studies and industry analysis suggest an increase in market risk capital requirements for both internal models approved banks and standardized banks. The new rules can also make market risk capital figures less stable over time in the scenario of an internal models desk being dropped back to the standardized approach if it doesn't meet stringent back testing and P&L attribution requirements. In order to understand the impact on capital under different business and regulatory scenarios, it is important banks perform analysis to assess the impact of FRTB on their capital as soon as possible.

The study shows an overall increase in market risk capital of between 1.5 and 2.4 times compared to current market risk capital. The lowest estimate of 1.5 times assumes all banks will receive internal model approval for all desks. If all banks fail the internal model tests for all trading desks, market risk capital would increase by 2.4 times

ISDA DERIVATIVEVIEWS, SUMMARY OF ISDA\GFMA\
IIF ANALYSIS, APRIL 2016

2. Architectural

The FRTB regulations will place a strain on legacy market risk infrastructures. The FRTB regulations require more complex aggregations to be performed in both the standardised and internal models calculations and the performance requirements of the calculations are also more demanding in terms of the number of valuations required and the volume of data to be aggregated in both capital approaches. The P&L attribution test will push banks to consider aligning the pricing used in their risk solutions more closely to the front office pricing. Finally the market data management requirements are also more demanding under FRTB with an increase in the number of risk factors that banks will need to manage and an increased focus on market data quality in order to manage non-modelable risk factors.

These considerations may be beyond what can be achieved through incremental change to an existing market risk system.

3. Operational

The operational challenge of running a market risk solution under FRTB will increase significantly. For internal models banks the need to perform back testing and P&L attribution tests at the desk level (rather than just at the level of the entire trading book) on a daily basis may result in an increase in the market risk production effort unless the market risk solution provides tools to automate many tasks and to highlight data quality issues to the user. The standardised approach also provides challenges in generating the required sensitivities and the associated static data to ensure they are allocated to the correct FRTB buckets.

Banks need to take a look at their existing risk infrastructure and review whether they can meet these requirements. For instance:

- Do calculation results for SA and IMA contain all trades or have any trades dropped out due to missing input data?
- For SA calculations what processes are in place to fill in gaps in the input sensitivities? Can your risk solution fill in any gaps in sensitivities supplied from other sources?
- Does your risk solution have automated processes in place to react to missing or late feeds?
- Can you explain the source of all risk and capital results and any changes?

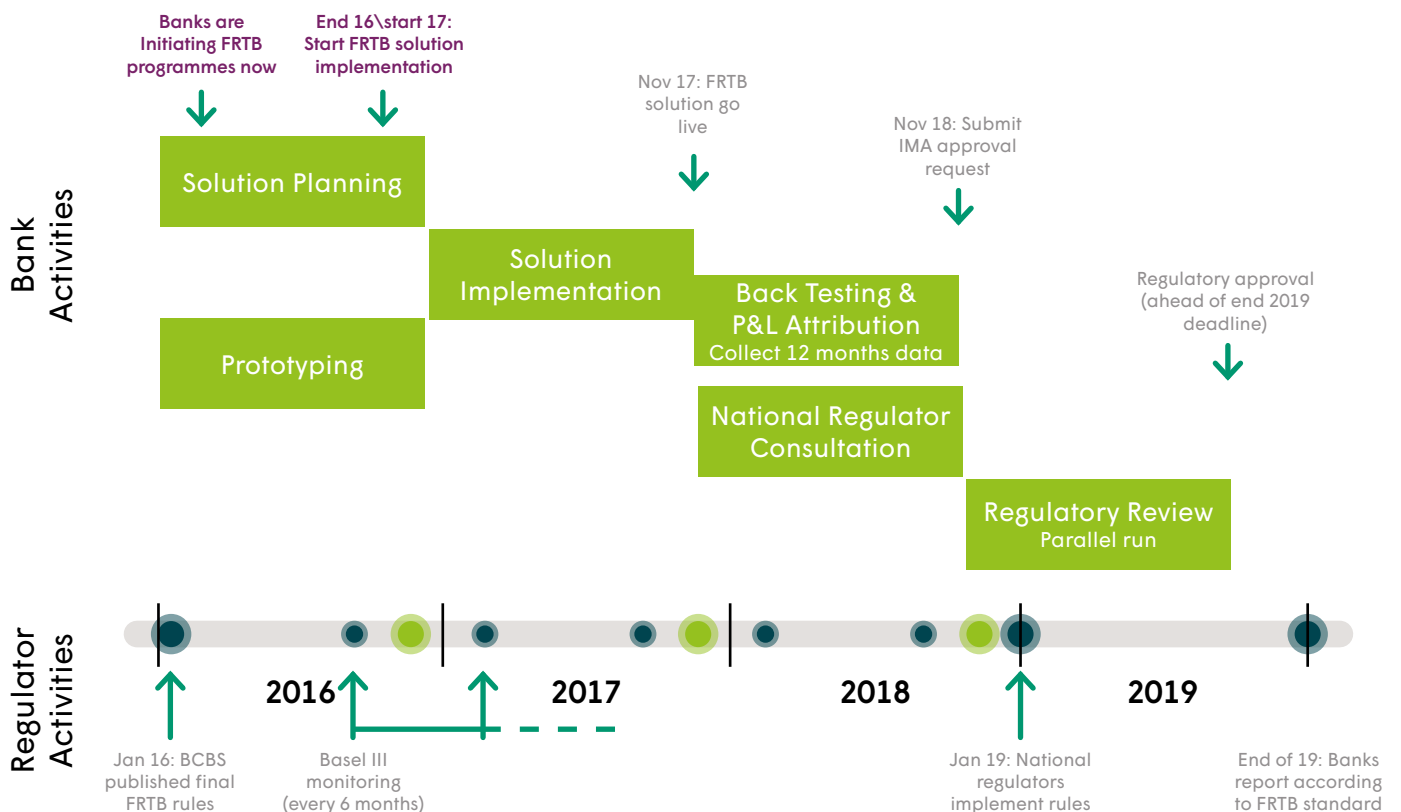
- What audits do you have in place to understand and document per day what overrides, and exception processing you have done in your reporting?
- What processes do you have in place to fix “as of date” results because of errors found? Does your risk solution allow you to recalculate past day’s results without copying databases onto a test environment?
- Does your risk solution integrate with all of the bank’s front office systems to provide a single point of aggregation and calculation?

Adaptiv provides a full risk infrastructure to manage these real world challenges in addition to providing the FRTB calculations.

4. Implementation

Banks are required to start reporting under the new FRTB regulations by the end of 2019. The following timeline illustrates the milestones and tasks that an IMA approved bank will need to undertake in the period leading up to that go live date. **It is clear from this timeline that IMA banks need to start planning for FRTB in 2016.**

FRTB implementation timeline



FRTB in Adaptiv

Banks are currently using Adaptiv for calculating their regulatory capital under the Basel 2.5 internal models approach including running VaR, stressed VaR and back testing processes. Adaptiv is being enhanced in 2016 to provide support for the new Basel FRTB regulations. Leveraging years of experience in the market risk space, Adaptiv will allow clients to satisfy the following FRTB regulatory requirements:

- **Standardised Approach (SA).**

- Sensitivity Based Approach (SBA) including:
 - Sensitivity generation
 - Management of static data to drive bucket assignment
- Default Risk Charge.
- Residual Risk Add-on.

- **Internal Models Approach (IMA).**

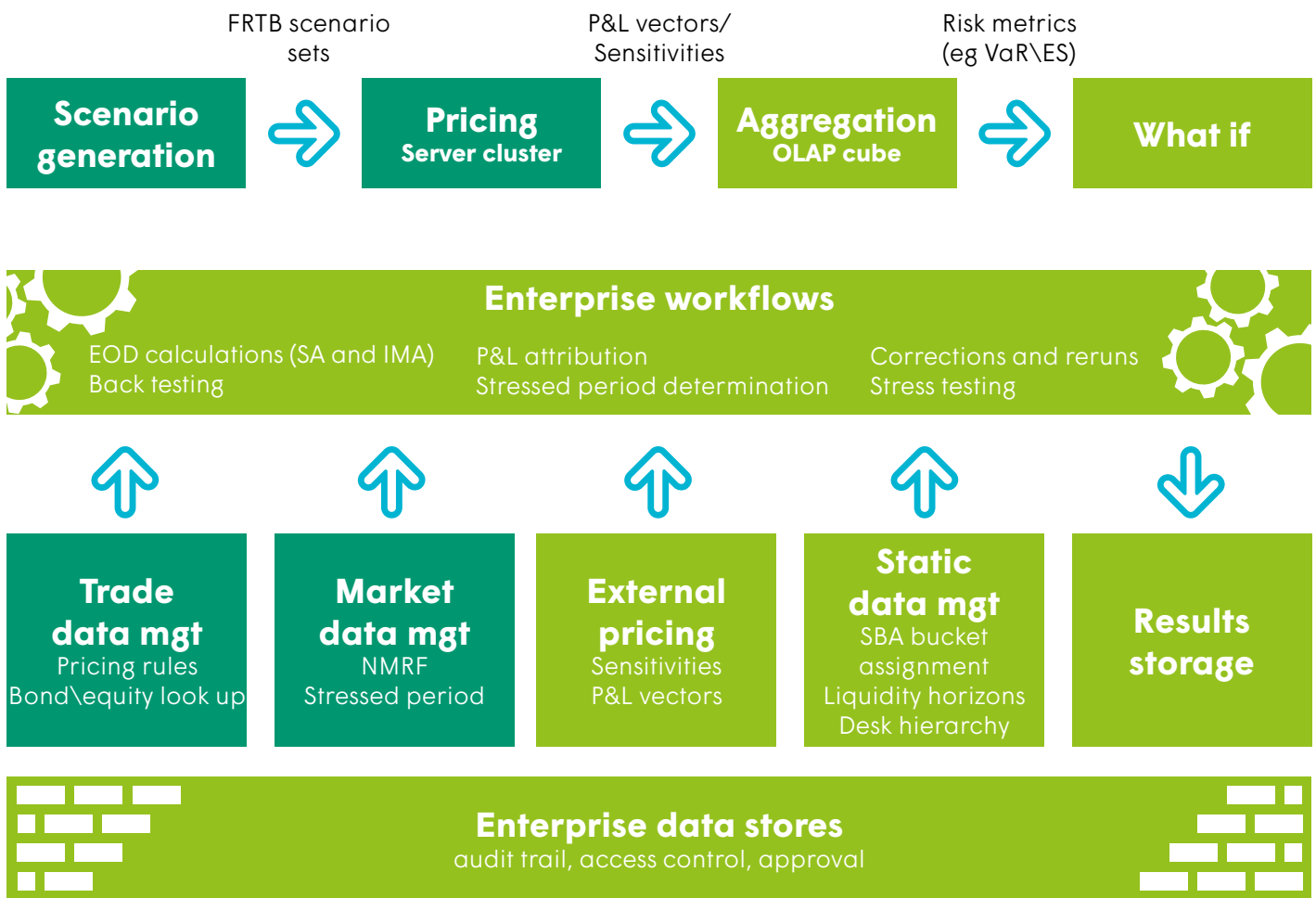
- The FRTB liquidity adjusted expected shortfall calculation including
 - stressed period handling
 - combination of constrained and unconstrained capital charges
- Capital calculation for non-modelable risk factors and calibration of shock size
- Default Risk Charge – building on the existing Adaptiv Incremental Risk Charge calculation
- Extensive pricing library covering all asset classes and tools to integrate external pricing inputs
- Support for FRTB-specific back testing and P&L attribution test.

FRTB calculation results in Adaptiv

FIS Adaptiv										
Adaptiv Home FRTB x										
FRTB Capital Dashboard										
										22/09/2015
Desk	Internal Models Approach				Standardised Approach					
	ES	SES (NMRF)	IMA DRC	IMA Charge	SBA Scenario	SA DRC	RRAO	SA Charge		
Bank	£883,865	£205,725	£1,231,515	£1,089,590	£13,340,075 High	£1,883,155	£8,628	£15,358,967		
Internal	£883,865	£205,725	£1,231,515	£1,089,590	£11,944,955 High	£1,883,155	£8,628	£13,954,774		
Domestic cash equity	£79,374			£79,374	£338,379 High			£339,830		
Domestic equity derivatives	£1,151			£1,151	£6,459 High			£6,469		
Domestic interest rates and derivatives	£646,181	£169,627	£887,634	£1,703,443	£9,191,598 High	£1,294,630		£10,557,757		
Emerging Markets	£921	£35,727		£36,648	£38,604 Medium			£38,604		
Foreign equities	£5,350			£5,350	£180,068 High			£180,068		
FX Derivatives	£223,835			£223,835	£669,613 High			£678,616		
International interest rates and derivatives	£313,670		£343,881	£657,551	£2,894,586 Low	£588,257		£3,512,250		
Quantitative equity strategies	£2,502	£371		£2,872	£39,292 High			£39,496		
Special opportunities	£142			£142	£286 Low		£8,628	£8,916		
Spot FX	£7			£7	£35 Low			£40		
Standardised					£1,477,274 High			£1,488,895		
Commodities – energy					£1,278,242 High			£1,281,773		
Commodities – metals					£309,885 High			£310,412		

Adaptiv FRTB Solution Architecture

The following diagram shows the Adaptiv FRTB solution architecture. The solution consists of a calculation engine (Adaptiv Analytics) and a chassis (Adaptiv Market Risk). Adaptiv Analytics can be deployed as a standalone solution or with some or all of the chassis. The components in dark green are only required for a full revaluation approach based on Adaptiv pricing:



Adaptiv approach to FRTB challenges

The FRTB requirements provide challenges to clients in several areas. Here is how the Adaptiv FRTB solution meets those challenges:

Challenge Type	FRTB challenge	Adaptiv FRTB solution
Capital impact	FRTB will increase market risk capital requirements	<ul style="list-style-type: none"> It is important for clients to be able to assess and optimize the capital impact ahead of a full FRTB solution implementation. Opportunities for optimization include consideration of different desk structures and modifications to the risk factor configuration to minimize non-modelable risk factor contributions Adaptiv provides a desktop solution (AA Studio) for performing impact analysis. The desktop solution employs the same in memory aggregation technology as the enterprise solution to provide dynamic what if capabilities on IMA and SA calculations Clients have used Adaptiv in BCBS Quantitative impact studies (QIS)
Architecture	The FRTB calculations involve more complex aggregations than existing risk calculations	<ul style="list-style-type: none"> The aggregation-heavy SBA and IMA calculations can be performed on the fly on huge data sets using the artiQ in memory aggregation technology
	The liquidity adjusted expected shortfall (ES) calculation required by FRTB is computationally expensive	<ul style="list-style-type: none"> Adaptiv's risk pricing models are built for high performance risk calculations while maintaining full accuracy artiQ in memory aggregation technology used by Adaptiv allows the ES results at desk level and firm level to be calculated on the fly from a single set of P&L vectors Adaptiv Analytics is a high performance calculation engine that scales well across multi-server environments (also GPU enabled)
	The FRTB P&L attribution test will be difficult to pass if risk calculations use different pricing to the front office	<ul style="list-style-type: none"> Adaptiv provides support for flexible pricing approaches where either native Adaptiv pricing can be used or front office pricing in the form of P&L vectors or PV grids can be imported (or a mixture of both).
Operational	Managing P&L attribution and back testing at desk level is going to require a bigger market risk team	<ul style="list-style-type: none"> Adaptiv is able to track breaches and near misses of metrics such as the P&L attribution and back testing thresholds providing users with early warning of problems. Adaptiv also provides tools to drill down into capital figures through desk and risk factor hierarchies all the way down to trade or scenario level data
	Expected shortfall is more sensitive to bad data than VaR	<ul style="list-style-type: none"> Adaptiv provides market data management tools to identify outliers in market data sets and (if appropriate) correct the data
	The FRTB expected shortfall metric is less intuitive and more difficult to hedge than previous market risk capital metrics	<ul style="list-style-type: none"> Support for pre-deal what-if analysis will be more important with FRTB Adaptiv provides high performance what-if capabilities for new trades or strategies
Implementation	It will be expensive to implement an FRTB solution	<ul style="list-style-type: none"> The Adaptiv Market Risk and Adaptiv Credit Risk products share a common platform. This means the Adaptiv FRTB solution can grow with the business to capture FRTB-CVA capital, Counterparty risk, XVA pricing and initial margin. By consolidating these different functions onto a single platform banks can reduce their total cost of ownership
	The FRTB implementation timeline doesn't provide much time to roll out a new market risk solution	<ul style="list-style-type: none"> Adaptiv Market Risk is already being used by banks for IMA reporting under the pre-FRTB rules. The new Adaptiv FRTB functionality is being overlaid on top of a production solution and provides a low risk option Adaptiv Market Risk solution is component-based so it's possible to deploy Adaptiv functionality for specific functions only alongside existing infrastructure Adaptiv professional services has a strong track record in integrating Adaptiv into bank IT infrastructures and business processes

FRTB capital stabilization

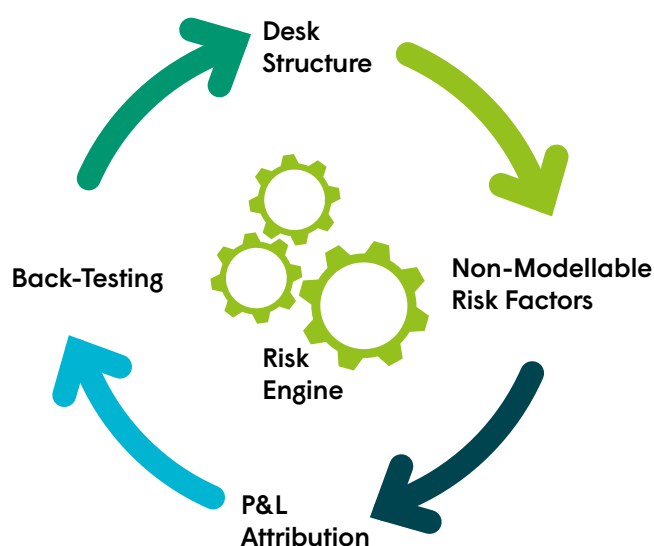
One of the most pressing analysis tasks during the transition onto FRTB capital reporting is the assessment of the capital impact of the new FRTB rules. For IMA banks the impact will depend on some choices in the areas of risk factor configuration and desk structure.

Examples of choices available in risk factor configuration are whether a risk factor can be included in IMA calculations or whether a non-modelable risk factor can be decomposed into a modelable component and a smaller non-modelable component.

There may also be some choice in the desk structure although it should be noted that the qualitative requirements of FRTB and the recent activities in relation to the Volcker rule may limit the scope of desk boundary changes. The desk structure will impact the stability of the FRTB capital figures under certain scenarios (e.g., if a particular desk falls through to the standardized approach does it have a large capital impact).

In order to “right-size” the capital impacts, banks need to perform an iterative capital analysis process where calculations are performed for different desk structure and risk factor configurations. For each calculation the bank must assess whether desks pass the P&L attribution and back testing requirements to remain in the internal models approach:

FRTB capital stabilization process



The Adaptiv FRTB solution can support this type of capital stabilization work by utilizing the Adaptiv Analytics engine as a standalone Impact Assessment tool. This tool can be used interactively or programmatically and can allow the bank to make the best decisions on its future business structure before submitting requests to their national regulator for IMA approval.

Conclusion

Adaptiv has the technology, the experience and the track record to be a bank’s key partner for an FRTB solution. Whether it is a complete end-to-end solution or a component for aggregation or a set of pricing libraries, contact one of our sales executives to discover what Adaptiv can do for you.

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