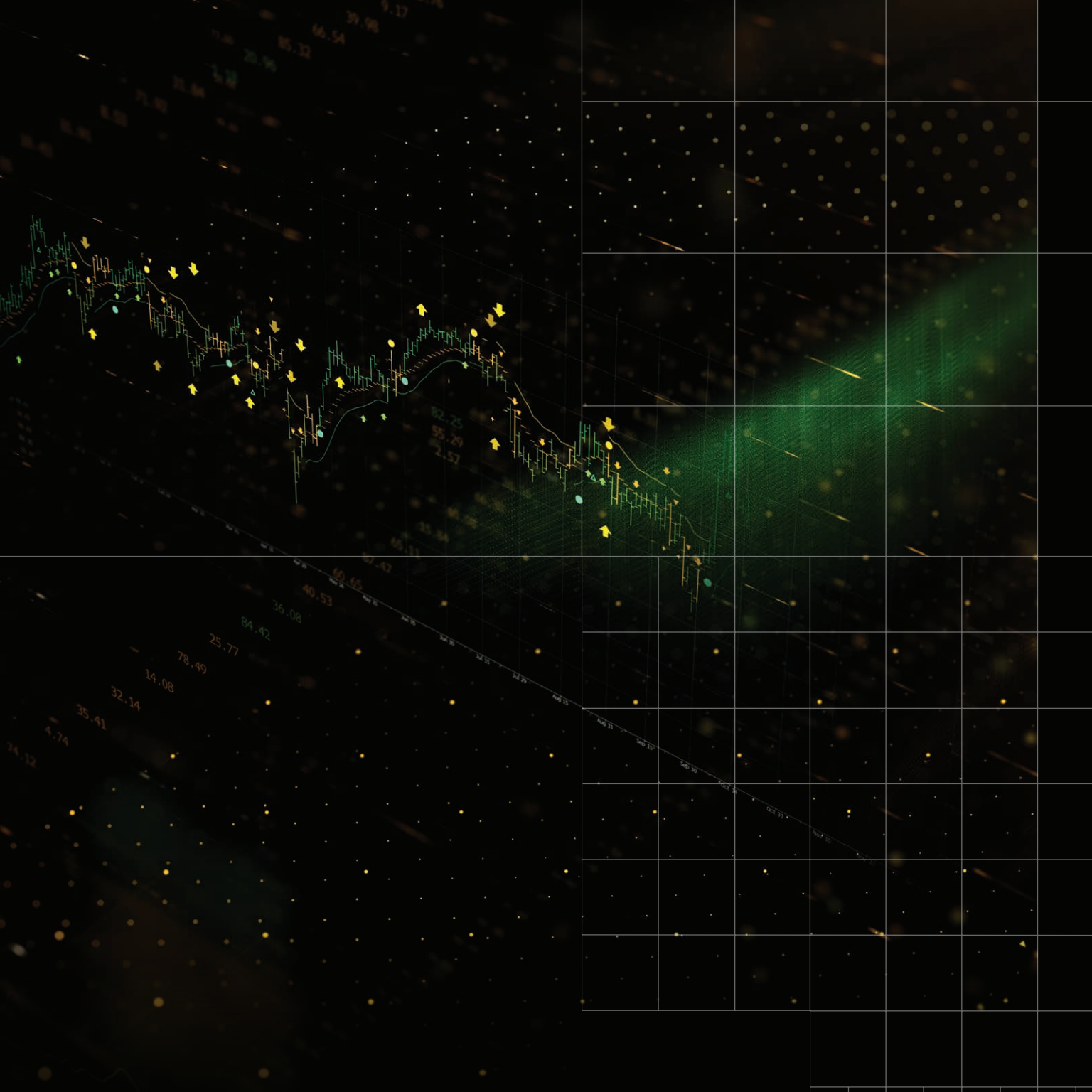


Bloomberg Solutions for Regulatory Market Risk Capital






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Bloomberg Solutions for Regulatory Market Risk Capital

Sell-side market risk managers need to focus on both the present and the future. Just as banks must comply with current regulatory requirements (such as Basel 2.5), most banks are overhauling their market risk technology stack to prepare for the upcoming Fundamental Review of the Trading Book regulatory framework.

The Fundamental Review of the Trading Book (FRTB) is the biggest global sell-side regulatory change in more than two decades, completely overhauling the framework for market risk following the severe market stress of 2007-2008. The purpose of FRTB is to ensure that regulatory market risk models deliver credible capital outcomes and promote consistent implementation of the standards across jurisdictions. The Basel Committee on Banking Supervision's Market Risk Group will finalize FRTB near the end of 2018, with full implementation required by the start of 2022. Risk managers must start planning now to meet this requirement.



The Basel 2.5 internal models framework calculates market risk capital in terms of VaR (Value at Risk) and stressed VaR, and requires backtesting of the model to gain regulatory model approval.

FRTB's internal models approach (IMA) replaces VaR with expected shortfall (ES), requires proof that the risk factors used in the model are derived from sufficiently liquid instruments (modellability), and requires banks to prove that the risk model is sufficiently aligned with front-office models (P&L attribution tests). Any desks that cannot meet these stringent criteria must calculate FRTB capital based on a revamped standardized approach (SA), which all banks must calculate in any case to serve as a floor for the IMA. The SA calculation is driven by risk sensitivities and multi-level formulas based on bucketing and netting rules, which have been specified in detail by the Basel Committee.

Bloomberg offers sell-side risk managers a complete suite of solutions, as well as data consistency, to help them comply with today's requirements and upgrade their systems and processes to meet the next generation of regulatory requirements.

MARS Market Risk is a complete, holistic solution powered by Bloomberg analytics and data. This includes data, such as risk classes and factors, bucketing, and verification of modellable/non-modellable risk factors (MRF/NMRF), configured specifically for FRTB.

Additionally, clients who also use Bloomberg Trade Order Management Systems (TOMS) benefit from consistent analytics between front office and risk to help align hypothetical and risk-theoretical P&L for the P&L attribution tests required to maintain IMA desk approval for all securities, including derivatives and fixed income.

Clients who want to use Bloomberg FRTB data as inputs into their internal regulatory market risk compliance processes can access this data through Bloomberg's Enterprise Data platform. This comprises a full FRTB data solution and facilitates data consistency for clients that need to use the same data across multiple analytics platforms as part of their FRTB workflow.

A full suite of Basel 2.5 analytics

MARS Market Risk includes all the analytics needed to comply with the Basel 2.5 market risk guidelines, including full revaluation Value at Risk, stressed Value at Risk and VaR Backtesting. The system also features a full set of capabilities for internal risk management of any book, including expected shortfall (conditional VaR), a full set of Greek sensitivities across all asset classes, and historical, hypothetical and predictive stress tests. To meet all of a bank's internal and regulatory risk management and reporting needs, all analytics and workflows are both modular and fully configurable. For compliance, the MARS Market Risk platform archives all risk results with an audit trail.

MARS Market Risk is built on top of Bloomberg's platform, integrating best-of-breed reference data, market data and pricing engines, thus enabling consistent firm-wide settings for all data and analytics used for risk. The common platform aligns internal and regulatory risk reporting, facilitates transparency across the system and significantly streamlines regulatory model validation, which can proceed step-by-step from simpler to more complex models.

Bloomberg Risk Management						
Sell Side E-Risk Demo						
Run Date: May 17 2018 Positions: May 15 2018						
Stressed HVaR Business Unit: Secondary + Fixed Income + Investment Bank +- M						
Breakdown By: DEMOTREE View in: USD Absolute						
	Stressed VaR		1 Year VaR			
	VaR	1D Chg	VaR	1D Chg	SD	1D Chg
↑ Sell Side	1,867,328,346	(31,203,997)	498,380,944	(8,999,471)	151,763,170	(2,671,174)
↑ Investment Bank	1,867,360,653	(31,203,517)	498,384,295	(8,999,311)	151,764,629	(2,671,142)
↑ Fixed Income	39,409,960	(636,635)	6,083,539	(21,479)	1,968,138	(5,315)
• Secondary	42,968,715	(449,149)	5,755,383	(41,083)	1,719,039	(17,583)
- Govt/Agency/IRD	42,971,369	(449,187)	5,761,048	(40,677)	1,719,096	(17,557)
- ABS	12,805	429	5,220	144	2,254	122
- Credit	23,036	(193)	13,178	1,508	4,776	144

MARS Market Risk offers VaR and Stressed VaR for Basel 2.5 capital.

Action				Proxy Table		What-if		Permission		Bloomberg Risk Management	
Sell Side E-Risk Demo				Status		Flash					
Run Date: May 17 2018 Positions: May 15 2018											
Backtesting Business Unit Secondary + Fixed Income + Investment Bank +- M											
Stat As Noted Breakdown By DEMOTREE View in USD Absolute											
		1Y 1D99 HVaR		Backtesting Pass/Fail		P Value					
↑	Sell Side	498,380,944		87,507,963	Pass	0.76					
↑	Investment Bank	498,384,295		87,497,569	Pass	0.76					
↑	Fixed Income	6,083,539		(763,885)	Pass	0.33					
•	Secondary	5,755,383		(454,819)	Pass	0.28					
+	Govt/Agency/IRD	5,761,048		(450,452)	Pass	0.28					
+	ABS	5,220		(1,563)	Pass	0.31					
+	Credit	13,178		(2,805)	Pass	0.29					

MARS Market Risk includes full backtesting of the VaR model.

An end-to-end FRTB Standardized Approach solution

The FRTB Standardized Approach (SA) module enables clients to take advantage of all the benefits of the MARS Market Risk platform. The SA module implements a new, Greeks-based risk calculation that is required for all entities regulated under the Basel market risk regime regardless of whether or not they also choose to run the Internal Models Approach (IMA). MARS Market Risk offers a full, and modular, FRTB SA solution that enables banks either to outsource their entire FRTB SA calculation or to combine Bloomberg's best-of-breed data, analytics and other features with their own internal systems and processes.

The FRTB SA module offered with MARS Market Risk platform includes:

- Automatic integration with Bloomberg's Trade Order Management solution (TOMS) holding data and firm hierarchies
- Mapping to FRTB risk factors, with GIRR, CSR, Equity, FX and Commodity; clients can take advantage of Bloomberg's full complement of rates, curves, surfaces and cubes or load their own
- Greek sensitivities driving the Sensitivities-Based Method (SBM) defined and calculated consistently for all asset classes using the MARS Market Risk analytics platform
- Jump-to-Default (JTD) analytics for the Default Risk charge (DRC) based on the same settings and data (prices, holdings, terms and conditions) as the SBM calculations
- Residual Risk Add-On (RRAO) instrument classification and notional amount
- Index constituent data across a broad set of index families and asset classes to meet the SA's index look-through requirements
- Risk bucket classification in accordance with Basel FRTB rules, including both SBM buckets and DRC buckets
- Basel risk weights and correlations with configurability to account for different national regulators' rulings on liquidity and applicability of spread and default risk
- Capital calculation and aggregation to calculate total charges by risk type, aggregate them for total SBM, DRC and RRAO charges, and calculate a total capital charge
- Instrument and firm-level outputs, including instrument-level sensitivities and firm- and node-level capital charges available in outbound files in standard formats (e.g., CRIF), as well as an interactive application for data viewing and updates
- Pre-trade what-if checks to gauge the impact that a prospective trade would have on capital
- Archiving and auditability to comply with regulatory requirements

The FRTB SA module enables clients to bring the unique advantages of the Bloomberg data and analytics platform (complete, consistent and transparent data and analytics coverage) to the risk and data principles underlying Basel's Fundamental Review.

Bloomberg Risk Management										
Run Date: Mar 09 2018 Positions: Mar 09 2018										
Total Capital C... Business Unit Firm + M										
Stat	As Noted	Breakdown By Firm		GIRR			FX	CSR	CSR S	
		SBM	Total	Delta	Vega	Curvature	Total	Total	Total	
#Portfolio		614,491	331,430	272,633	15,017	43,780	26,253	2,853	151	
#Fixed Income		489,424	331,848	273,052	15,017	43,779	2,746	2,575	151	
#CMBS		305,161	153,171	153,171	--	--	--	--	151	
#Govt/Agency/IRD		7,454	4,547	4,370	177	0	754	2,154		
#NY		3,738	1,650	1,473	177	0	57	2,030		
#London		4,226	3,128	3,128	--	--	710	388		
#Asia		179	179	179	--	--	0	--		
#Credit		3,278	590	487	32	71	1,797	200		
#ABS		193,120	193,045	126,286	15,116	51,643	--	0		
#Muni		1,662	611	559	52	0	697	295		
#Exchange Traded		1,781	273	273	0	0	1,023	485		
#Future		573	34	34	0	0	512	--		
#Govt/Agency/IRD		1,316	251	251	--	--	580	485		
#Currency		35,226	870	869	0	1	26,711	--		
#FX		34,625	760	760	--	--	26,857	--		
#Future		255	222	221	0	1	--	--		
#Cash		1,663	--	--	--	--	1,663	--		
#EQUITY		104,410	1,221	1,221	--	--	1,142	--		
#AMERICAS		104,178	1,221	1,221	--	--	1,004	--		

Bloomberg's FRTB SA solution features capital numbers calculated bottom up from their risk factor and individual position components.

Bloomberg Risk Management										
Run Date: Mar 09 2018 Positions: Mar 09 2018										
Total Capital C... Business Unit Firm + M										
Stat	As Noted	Breakdown By Firm		BI550						
		Total	3M	6M	1Y	2Y	3Y	5Y	10Y	
#Portfolio		-1,209,747	-74	-219	-122,408	-83,811	-1,209	-3,291	-258	
#Fixed Income		-1,209,747	-74	-219	-122,408	-83,811	-1,209	-3,291	-258	
#CMBS		--	--	--	--	--	--	--	--	
#Govt/Agency/IRD		-1,144,755	-74	-219	-91,184	-54,501	0	0	-258	
#Credit		-64,992	0	0	-31,225	-29,310	-1,209	-3,291		
#ABS		0	0	0	0	0	0	0		
#Muni		--	--	--	--	--	--	--	--	
#Exchange Traded		--	--	--	--	--	--	--	--	
#Currency		--	--	--	--	--	--	--	--	
#EQUITY		--	--	--	--	--	--	--	--	

The solution enables you to drill into individual sensitivity calculations both at firm and instrument level.

Tools for FRTB Internal Models Approach

Banks that need to implement the Internal Models Approach (IMA) for some desks – either to reduce their market risk capital or because it is required by regulators – will have to navigate a new, complex set of challenges for both analytics and data management:

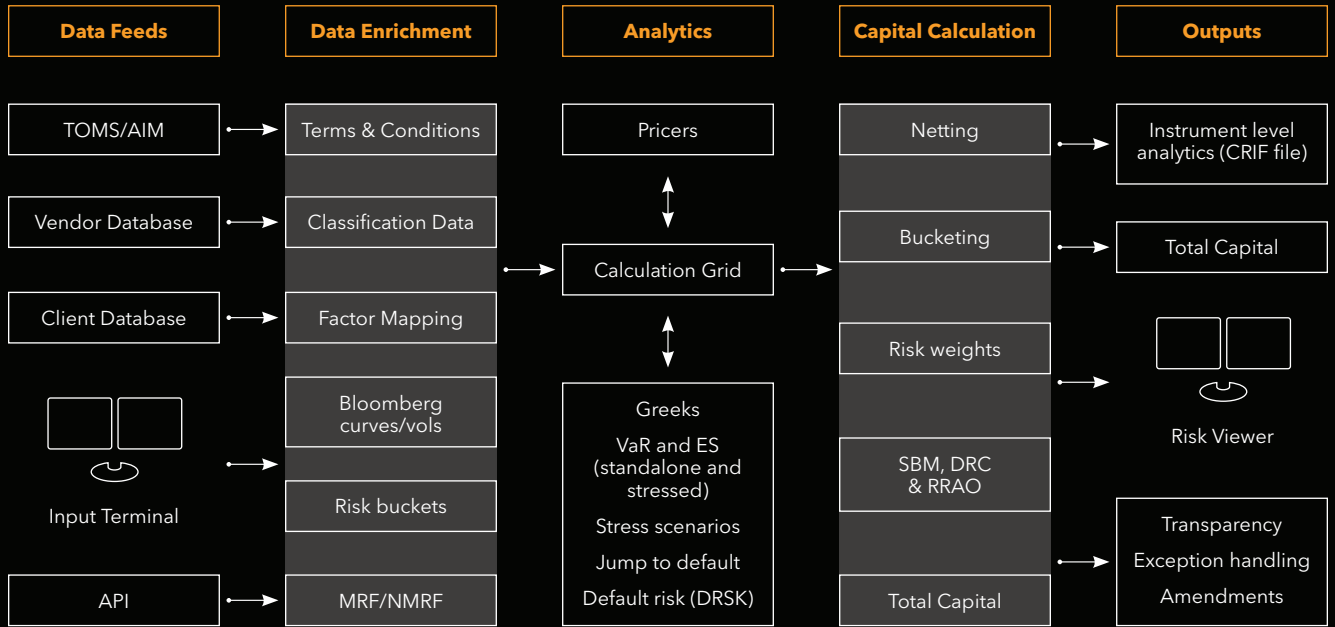
- On the data side, banks will need to identify enough modellable risk factors for their book to be able to pass both backtesting and P&L attribution tests and collect enough data on the trade level to prove modellability. They will also need inputs to a portfolio credit model (default probabilities, loss given default, cross-issuer correlations) for the IMA's version of the Default Risk Charge (DRC).
- On the analytics side, banks will need the flexibility to run expected shortfall (ES) at multiple liquidity horizons, as well as to vary the risk factors used in the models both for different versions of expected shortfall and stressed expected shortfall (SES), and for the multiple model approval tests (P&L attribution and backtesting). Banks will also need to run portfolio credit risk for the DRC and to have flexible stress testing capabilities to calculate the Stressed Capital Add-On corresponding to non-modellable risk factors (NMRF).

In addition, data integration is likely to be a huge impediment, as banks that run IMA are likely to need to bring together cross-asset class data housed in multiple systems in a consistent way – both for risk simulation and aggregation and for data validation (e.g., NMRF).

Bloomberg offers multiple client-tested tools across its MARS Market Risk and Enterprise Data platforms to help clients manage the multiple demands of FRTB IMA:

- Default risk data on individual issuers from our Merton-implied default risk engine (DRSK) delivered via Bloomberg Enterprise Data feeds
- MRF/NMRF instrument-level data and risk factor classification based on trade data contributed by multiple market participants to a Bloomberg data consortium, with different levels of availability depending on contribution participation
- Flexible expected shortfall calculator in MARS Market Risk, with risk factor mappings and analysis horizons configurable by the client
- Backtesting and P&L attribution tools to aid with calculation of hypothetical and risk-theoretical P&L in accordance with Basel requirements
- TOMS integration, including automatic loading of TOMS positions as well as consistent analytics for front office and risk to help align hypothetical and risk-theoretical P&L for the P&L attribution tests required to maintain IMA desk approval
- Open architecture for risk analytics, including the ability to control risk factor mappings, upload market data and prices, and merge P&L scenarios for risk aggregation
- Risk Scenario API that gives clients full control to upload their own simulation scenarios to the MARS platform for P&L calculation, aggregation and risk statistics generation

Bloomberg's MARS Market Risk architecture, including FRTB SA and IMA solutions, allows clients to pick and choose different elements depending on their specific internal workflow and needs as illustrated below:



Client use case scenarios

Basel 2.5 analytics: TOMS clients looking for VaR and Stressed VaR, along with backtesting, for regulatory compliance for the current Basel 2.5 regime can have their TOMS positions pulled automatically on to the MARS Market Risk platform, which will perform these calculations. Clients can also include non-TOMS positions by loading them on a nightly basis using a standard Bloomberg loader format.

Complete FRTB SA solution: Institutions such as regional banks that are looking for an end-to-end FRTB Standardized Approach solution can use the MARS Market Risk FRTB SA module to calculate the analytics (sensitivities, JTD, RRAO notionals) and the full capital charge. TOMS positions are pulled in automatically; non-TOMS positions can come in via the standard Bloomberg loader.

SA analytics for TOMS books: Banks that manage their fixed income books in TOMS and other books in other systems can use MARS Market Risk to generate SA sensitivities consistent with their front-office data and analytics. This consistency is growing in importance for both banks and regulators with the adoption of the principles of BCBS 239. MARS Market Risk pulls TOMS positions automatically on a nightly basis, calculates sensitivities using data, analytics and settings consistent with the calculations used in TOMS, writes the results to a standard output format (CRIF) and delivers them to the bank. The bank can then combine MARS output with sensitivities for other books calculated in other systems and calculate the total capital.

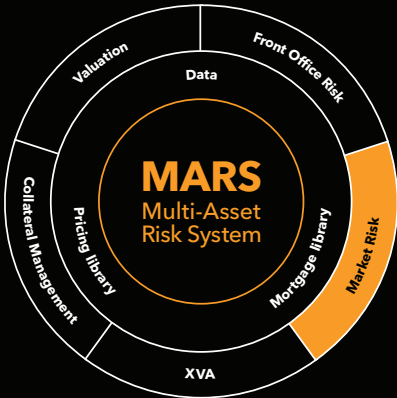
SA analytics and aggregation: Smaller banks may have positions in multiple systems, including TOMS, but may lack the ability to net Greeks from multiple sources and calculate the Basel SA capital formulas internally. A bank can send Greeks from other systems to Bloomberg in a CRIF format. MARS Market Risk can then calculate Greeks for the TOMS books, combine them with the Greeks received from the client, do the bucketing and netting, and calculate the FRTB SA capital.

Expected Shortfall for IMA for TOMS books: Similar to the Basel 2.5 workflow, TOMS clients looking to implement IMA for some of their books can have a workflow that pulls their TOMS positions into MARS Market Risk and calculates Expected Shortfall at multiple liquidity horizons with different sets of risk factors. The same platform can calculate risk-theoretical and-hypothetical P&L the next day.

Scenario P&Ls via API for IMA: Larger banks implementing IMA may need help with scenario P&Ls for certain asset classes (especially those traded on TOMS), while still controlling the market data and risk model. Such a bank could use its risk model to generate consistent simulation scenarios across the firm, then write those scenarios into Bloomberg's scenario language (SHOC) and upload them to the MARS Market Risk platform on a nightly basis using the SHOC API. MARS Market Risk would pull in the TOMS positions, calculate the P&Ls for each uploaded scenario and return them to the client for aggregation and capital calculation.

Multiple workflows: Banks needing help implementing both SA and IMA can take advantage of any of the implementation options described here or design their own. For example, a bank could use MARS Market Risk's out-of-the-box SA solution while using the SHOC API as a conduit between its risk model and Bloomberg's pricing engines for books that are candidates for IMA.

MARS Multi-Asset Risk System



The Multi-Asset Risk System provides consistent and consolidated valuation, product lifecycle analysis, market risk, counterparty risk and collateral management.

MARS is powered by Bloomberg’s world-class pricing library, market data and mortgage cash flow engine and enables front-office, risk and collateral professionals to analyze their trading and investment portfolios, mitigate risk and prepare for the unexpected.

Learn more

To learn more about Bloomberg’s risk solutions, visit **RISK <GO>** on the Bloomberg Terminal or contact us at riskinfo@bloomberg.net.

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