

The Authors



Hadrien van der Vaeren



Scott Warner

Abstract

With the Fundamental Review of the Trading Book (FRTB) nearing completion, the industry's attention will move from assessing the impact to implementing the requirements. Given the magnitude of the changes required, this move will create many interesting challenges for banks. One of these challenges will be the adaptation of their IT systems to comply with the new requirements.

The new requirements entail a considerable change in the methodology used to compute capital requirements, which leads to a significant increase in IT development. To begin with, all banks must implement the standardised approach for the computation of capital requirements. In addition, those banks aiming for the internal models approach will need to compute an increased number of risk measures (three Expected Shortfalls, a Default Risk Charge, two backtests, a Value-at-Risk and a PnL attribution). Furthermore, greater flexibility will be required, as the scope of internally approved desks could change at any time.

This Briefing Note presents an overview of the impacts the FRTB will have on IT systems, followed by an industry survey, which was conducted to assess how the major European banks are dealing with these challenges.

Introduction

The new regulatory framework covering the trading book is close to completion, with the fourth FRTB QIS¹ completed by the 7th of October 2015 and the final Basel text expected at the end of 2015. Banks can therefore start industrialising the new requirements, which will require significant changes to their IT infrastructures. This paper summarizes the various systems requirements that banks will need to implement, before providing an overview of what the industry's major players are doing to meet these challenges.

Overview of the new processes

Banks are required by the FRTB to compute their capital requirements in accordance with the standardised approach; in addition, they may choose to also compute these requirements according to the internal models approach². This means that for a number of banks two processes will be run in parallel.

Processes for the revised standardised approach

The FRTB requires all banks to compute capital requirements under the standardised approach. The new standardised approach, known as the Sensitivity-Based Approach (SBA), will require more IT resources because the computations have become significantly more intensive; the SBA requires banks to:

- Compute sensitivities on all positions;³
- Fully reprice all options twice for every underlying risk factor;
- Compute jump-to-default risk for relevant instruments; and
- Perform aggregation under three sets of correlations.

In addition, the scope of the data feeds into the computations will need to be flexible in order to accommodate the new definition of positions subject to trading book capital requirements⁴. Finally, for banks that receive an internal model approval, the SBA computation will need to be computed twice on top of the internal model computation; these two computations are one for all

¹ / Basel Committee on Banking Supervision, *Instructions: Impact study on the proposed frameworks for market risk and CVA risk, Bank for International Settlements, July 2015.*

² / The minimum capital requirements will be based on the internal models approach only after gaining regulatory approval.

³ / How these sensitivities are to be computed is prescribed, and may differ from how banks are currently computing them; one example is the requirement to use market interest rates instead of zero coupon rates.

⁴ / Generally speaking, the scope is still: A) all trading book positions and B) banking book positions with commodity or foreign exchange rate risk. However, the definition of the trading book versus the banking book has been reviewed, and a number of modifications have been added (such as those relating to net short positions and internal risk transfers).

positions (to report the SBA result as if they had no internal model) and one for the positions of unapproved desks.

Processes for the revised internal models approach

Banks implementing an internal model will also see their IT requirements expand significantly, because of the increase in the data history needed and the number of computations to be done.

The new data history should cover at least 10 years for at least 75% of the full Expected Shortfall (ES) model⁵. This coverage will be a significant data collection challenge; it will increase storage requirements, and it will heighten the computational burden of finding the stressed period (which must be updated at least monthly). In addition, the overhead of computing the risk measure under both the current and the stressed periods will remain (except for those banks that have a 10-year history for all their positions).

The following table compares the most important aspects of the new requirements to those under Basel 2.5.

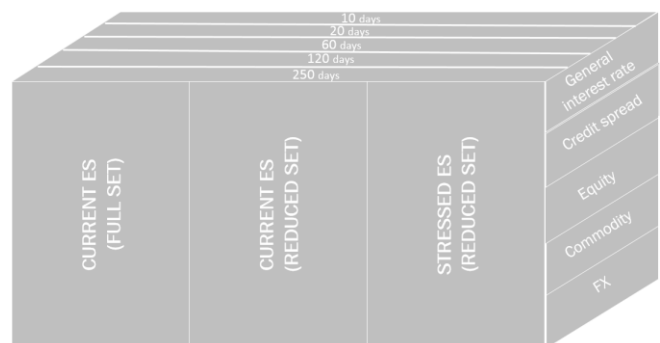
Purpose	Basel 2.5	FRTB
Capital requirements	10-day Value-at-Risk (VaR)	10-day Current ES (reduced set), and 10-day Current ES (full set)
Capital requirements	10-day Stressed VaR	10-day Stressed ES (reduced set)
Default risk	Incremental Risk Charge (IRC)	Default Risk Charge (DRC)
Backtesting	1-day VaR	1-day VaR ⁶
Backtesting	1-day Backtest (BT)	1-day hypothetical BT & 1-day actual BT
PnL attribution	No specific requirements ⁷	Must be carried out
Non-modellable risk factor (NMRF)	Concept did not exist	Stress tests to be applied

The previous table, however, provides only a partial view of the expansion in data processing. Previously banks could run their VaR and SVaR at an aggregate level, diversifying across risk factors. The

FRTB limits diversification, requiring them to separately compute ES for five liquidity horizons and the seven risk classes⁸, raising the number of data aggregations that must be carried out.

Under Basel 2.5, the formula to derive capital requirements was relatively simple – the sum of the average VaR and the average SVaR⁹ – but under the FRTB the formula is far from straightforward. Banks must compute the Expected Shortfall for the current period – both on a reduced and a full set of risk factors – and for the stressed period (on the full set only). Then they must scale these to the required liquidity horizon before aggregating them.

The following graph represents the various dimensions over which a bank must aggregate its Expected Shortfall computations:



At this stage a bank has computed a large part of its capital requirements, but additional computations are required for default risk and Non-Modellable Risk Factors (NMRFs). Default risk is still to be computed using a 99.9% one-year Value-at-Risk. The methodology for this computation has not evolved significantly from the Incremental Risk Charge except for its scope.¹⁰ Finally, Non-Modellable Risk Factors (NMRFs) are to be capitalised using individual stress scenarios, calibrated to be at least as severe as a 97.5% ES, with the horizon being the greater of the assigned risk factor horizon and the interval between two consecutive price observations. Under its current form, the NMRFs will require running a great number of stress scenarios, as each NMRF could be linked to a different stressed period. This requirement is likely to lead to overcapitalisation, as it does not account for diversification. Hence it may be relaxed, as is indicated by the

⁵ / The 75% should be met on average over the preceding 12 weeks.

⁶ / Technically two VaR measures must be computed, at a 97.5% and 99% confidence interval. But as most banks compute the VaR by creating a full PnL distribution, therefore computing one or two measures does not defer significantly.

⁷ / Note that most (if not all) banks had PnL explain in place. But these didn't directly impact capital requirements therefore capabilities and storage constraints were most likely lower.

⁸ / General interest rate risk, credit spread risk for non-securitisations, credit spread risk for securitisations, credit spread risk for securitisations (correlation trading portfolio), equity, commodity, and foreign exchange.

⁹ / Assuming that the latest VaR and SVaR are not significantly (3 to 4 times) greater than the average VaR and SVaR.

¹⁰ / Previously, the Incremental Risk Charge (IRC) covered both default and migration risk, while the Default Risk Charge (DRC) covers only default risk. In addition, for equities the IRC could be computed but was not mandatory, while the DRC must cover them.

closed form questions of the Quantitative Impact Study (QIS)¹¹, which assess the impact of using a single stress period.

To monitor the ongoing performance of their internal models, banks must carry out two backtests (actual and hypothetical) and a PnL attribution. The two backtests must be compared to both the 97.5% and 99% confidence intervals of Value-at-Risk. All these measures must be computed at a desk level, meaning that two 1-day VaR's¹², two 1-day backtests and a daily PnL attribution must be carried out for each desk.

Industry survey

Avantage Reply conducted discussions with a number of banks and one leading software provider to assess the current state of the market and its expected evolution. The banks covered four European countries and had the following profile:

Main approach	Internal models approach	Standardised	Not traded
IR	85%	15%	0%
FX	85%	15%	0%
Commodities	70%	15%	15%
Equity	70%	15%	15%

Of the banks that had an internal model approval, all used historical simulations, except for one with Monte Carlo simulation. Of the banks approved for an internal model for interest rate risk, only one did not have approval to compute the IRC charge with an internal model. Finally, none of the banks with an internal model had systems to compute their capital requirements under the current standardised approach.

QIS participation

All but one bank participated and submitted data for the previous FRTB QIS. Most fully participated, while one participated only partially (not submitting the Risk-Weighted Asset requirement for options under the SBA).

The bank that did not participate in the QIS is part of a foreign bank which participated only at the global level. At the local level an assessment of the FRTB requirements was carried out.

Implementation of the Sensitivity-Based Approach (SBA)

While computing the standardised approach was new for most of banks sampled, most were comfortable with the potential complexity of implementing the SBA. These banks already have the majority of the data required for the computation. Two banks noted that the computations for the QIS had been simple enough to be performed in end-user computing systems such as Excel and Access. One bank stated that it would need to make some changes in how it computes sensitivities in order to be FRTB-compliant. Another mentioned that the full revaluation requirement for options could be challenging because of its computational intensity.

In contrast to the low implementation complexity seen by the banks, according to the software vendor the focus of its clients was on the SBA. This emphasis is due to the compulsory nature of the computation and its novelty for banks.

Regarding the future implementation of the SBA, most banks stated that they were nearly certain to develop the processes internally. One mentioned that it would seriously consider using a vendor system, while two noted that no clear view had emerged. Banks that currently compute their capital requirements under the standardised approach said that they did not expect to change their infrastructure – they use vendor trading/pricing systems that feed into in-house systems for these computations.

Only two banks stated that work had already been undertaken regarding the implementation of the FRTB. Both of these had performed this work as part of BCBS 239¹³ projects.

Implementation of the internal models approach

Banks that currently do not have internal models for the computation of capital requirements will not develop an internal model under the FRTB. Of those that currently have an internal model approval, all but one said they expected to apply for such an approval under FRTB as well.

All but one bank used their front office pricing systems for the current internal model computations. Those that already had a clear view on how they would implement the FRTB expected to

¹¹ / Basel Committee on Banking Supervision, Specification of the closed form questions for the QIS on the Fundamental review of the trading book (based on end-June 2015 data), Bank for International Settlements, August 2015.

¹² / The FRTB requires the computation of VaR at both the 97.5% and 99% confidence intervals.

¹³ / Basel Committee on Banking Supervision, Principles for effective risk data aggregation and risk reporting, Bank for International Settlements, January 2013.

continue using front office pricers and to internally develop the rest of the processes required for an internal model. All recognised that the computational intensity of the FRTB would be a challenge; one bank specified that, for the latest QIS, it had to increase the number of its daily processes to compute internal model capital requirements from 5 to 70.

One bank expressed that, given the complexity of the new requirements, they envisaged the possibility of using a vendor system. For this bank the first step was redefining its strategy and thereafter aligning its FRTB implementation with this. They were not currently convinced that added value would be gained by developing their own internal model. Therefore the choice between in-house developments and vendor systems (or a combination) was mostly concerned with minimizing the cost of the FRTB implementation.

The software provider mentioned that they believed that handling the computational intensity of the FRTB internal models approach was one of their strengths, as their system is highly optimized. It uses a similar architecture to develop the FRTB internal model as the one for CVA. Under Basel 2.5, the number of computations needed for historical VaR was about 10 times smaller than that of Monte Carlo VaR, which was itself dwarfed by the 2500 times larger requirements for CVA sensitivities.

In addition to the computational intensity, one bank mentioned that it was also concerned that the additional data requirements would require significant work to comply with the FRTB.

Clarification required

Different banks mentioned that current uncertainty was holding them back from making decisions on the FRTB implementation. Most noted two different sources of uncertainty that affect the attractiveness of internal models compared to the standardised approach:

- The ongoing changes in the FRTB (for example, the vega risk weight, which changed from 0.55 to 0.0032 for general interest rate risk and credit spread risk between the 3rd and 4th consultative documents); and
- The uncertainty surrounding the potential introduction of capital floors based on the standardised approach¹⁴.

One bank mentioned that it had made some changes to its IT systems after the 2nd consultative document in order to enable a

multi-horizon computation. But these developments become obsolete after the subsequent change in the Basel Committee's approach. Therefore this bank decided to halt changes in its production environment until the final FRTB becomes clear.

Although the banks were awaiting the availability of the final text to assess the attractiveness of the internal models approach over the SBA, most expect to continue with an internal model. In addition, a number noted that, given their size and significance, their regulators expect them to apply for internal models approaches.

With regard to interactions with their regulators, all banks said that so far no clear expectations had been given concerning FRTB implementation, and that the dialogue consisted mostly of practical questions about the QIS.

How can we help

Avantage Reply is a specialised management consultancy delivering initiatives in areas including market risk. Our capabilities include regulatory interpretation and implementation, and business and technology change. We would be happy to discuss the FRTB with you.

¹⁴ / Basel Committee on Banking Supervision, *Capital floors: the design of a framework based on standardised approaches, Bank for International Settlements, December 2014.*

Contacts

Avantage Reply (Amsterdam)

The Atrium | Strawinskylaan 3051
1077 ZX Amsterdam
Netherlands
Tel: +31 (0) 20 301 2123
E-mail: avantage@reply.eu

Avantage Reply (Rome)

V.le Regina Margherita, 8
00198 Roma
Italy
Tel: +39 06 844341
E-mail: avantage@reply.it

Avantage Reply (Brussels)

5, rue du Congrès/Congresstraat
1000 Brussels
Belgium
Tel: +32 (0) 2 88 00 32 0
E-mail: avantage@reply.eu

Avantage Reply (Turin)

Via Cardinale Massaia, 83
10147 Torino
Italy
Tel: +39 011 29101
E-mail: avantage@reply.it

Avantage Reply (London)

38 Grosvenor Gardens
London SW1W 0EB
United Kingdom
Tel: +44 (0) 207 730 6000
E-mail: avantage@reply.eu

Xuccess Reply (Berlin)

Mauerstrasse 79
10117 Berlin
Germany
Tel: +49 (30) 443 232-80
E-mails: success@reply.de

Avantage Reply (Luxembourg)

46a, avenue J.F. Kennedy
1855 Luxembourg
Luxembourg
Tel: +352 26 00 52 64
E-mail: avantage@reply.eu

Xuccess Reply (Frankfurt)

Hahnstrasse 68-70
60528 Frankfurt am Main
Germany
Tel: +49 (0) 69 669 643-25
E-mail: success@reply.de

Avantage Reply (Milan)

Via Castellanza, 11
20151 Milano
Italy
Tel: +39 02 535761
E-mail: avantage@reply.it

Xuccess Reply (Hamburg)

Brook 1
20457 Hamburg
Germany
Tel: +49 (40) 890 0988-0
E-mail: success@reply.de

Avantage Reply (Paris)

5, rue des Colonnes
75002 Paris
France
Tel: 33 (0) 1 71 24 12 25
E-mail: avantage@reply.eu

Xuccess Reply (Munich)

Arnulfstrasse 27
80335 München
Germany
Tel: +49 (0) 89 - 411142-0
E-mail: success@reply.de