Agenda

1. Context of the FRTB consultation – Evolution and revolution

2. CH&Co. Market Research – How do market participants interpret the reform?

3. CH&Co. FRTB offer – Nature of interventions and edge

4. Appendices
1. Context of the FRTB consultation – Evolution and revolution
   1 – The origins of a market revolution *(Why FRTB?)*
   2 – The regulatory reform *(What is FRTB?)*
   3 – The impacts for banks *(What are the capital charges?)*
   4 – The operational challenges *(What are the priorities?)*

2. CH&Co. Market Research – How do market participants interpret the reform?

3. CH&Co. FRTB offer – Nature of interventions and edge

4. Appendices
The purpose of FRTB is to cover **shortcomings** that both regulations and internal risk processes **failed to capture** during the 2008 crisis.

It shows a strategic reversal and the willingness of regulators for:

- **a convergence between risk measurement methods** (standardized approach vs advanced approach)
- **an integrated assessment of risk types** (from a silo risk assessment to a more comprehensive risk identification)
- **an alignment between prudential and accounting rules**

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**Market Risk RWA Variability**

- Following investigations led by the Basel Committee market risk RWA vary significantly across jurisdictions and portfolios.
- This variability could be explained (partially) by discrepancies in modeling methodologies as well as the approaches (STD vs Adv.).

**Arbitrage opportunity: Banking book vs Trading book**

- The classification of assets between the banking book and trading book was unclear allowing arbitrage opportunity for RWA optimization.
- For instance, the credit risk component in the banking book is more demanding in terms of RWA in comparison to the trading book.

**Volatility of capital assigned for trading positions**

- Pro-cyclicality of market risk measures has been revealed in the past few years, especially for banks using the advanced approach.
- As a consequence, the volatility in capital assigned for trading positions is a concern not in line with regulatory expectations.

**Model risk for structured and complex products**

- The models used as well as the underlying assumptions were unable to capture embedded risks in complex products.
- Whether related to the use of historical data or the nature of the products itself, model risk has been looked upon very closely.

**Comprehensive risks coverage**

- Both regulatory constraints and internal processes failed to ensure a comprehensive coverage of all embedded risks in trading positions.
- The liquidity component of the trades had not been captured nor the increasing credit risk components embedded in credit derivatives.

**Granularity, data quality and aggregation**

- The level of granularity on which risk factors were monitored seemed insufficient to fully capture real trends in the trading portfolios.
- The aggregation of data (and its quality) introduced imperfections and myopia in risk measures.
10 KEY CHANGES WITH DIFFERENT REGULATORY OBJECTIVES

• Reduce incentives for a bank to arbitrage its regulatory capital requirements

• Repair weaknesses with the VaR-based framework
  – Better capture credit risk inherent in trading exposures
  – Stop / reduce Incentives for banks to take on tail risk
  – Better capture the risk of market illiquidity
  – Better recognition of the risk-reducing effects of hedging and diversification

• Define a more granular model approval process

• Impose constraints on the effects of hedging and portfolio diversification

• Define closer calibration between the revised standardised and internal model approaches

• Put in place a common risk data infrastructure to support both approaches

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SUMMARY | Revised minimum capital requirements for market risk
From BIS – January 2016

### Revised Boundary Trading / Banking
1. Additional guidance on the contents of the trading book
   - Presumption list
   - Approval for any deviations from the list
2. Reducing the ability to arbitrage the boundary
   - Limit on movements
   - No capital charge benefit allowed in a switch
3. Reporting requirements
   - Regulatory reports on boundary compliance, inventory ageing, daily limits, intraday limits
4. Treatment of internal risk transfers across the regulatory boundary
   - Limits on the internal risk transfers of equity and interest rate risks

### Internally-modelled approaches
5. Single Expected Shortfall (ES) metric
   - ES @ 97.5% with sub-additivity
   - ES Stressed calibration
   - Stress on a reduced set of risk factors ( >75% of the ES variation explained)
   - Different liquidity horizons
   - Liquidity horizons by risk factors and not by instruments
   - Full revaluation (no proxies)
6. Trading desk level
   - Internal model approval @ trading desk level
   - Test based on (P&L) attribution
   - Backtesting
   - Non modelable risk factors...
7. Capital-reducing effects of hedging and diversification
   - Revised correlation factor for diversification
   - A Default Risk Charge (DRC) model

### Standardized-modelled approaches
8. A sensitivity-based method
   - 3 risk sensitivities: “delta”, “vega” and “curvature” risks
   - Capital charge calculated for the individual risk factors
   - CC aggregation process: bucket level > Risk class level - >aggregated CC
9. A standardised default risk charge
   - Limited hedging recognition
10. A residual risk add-on
   - Specific risk weights for residual risks (1.0% for exotic instruments, 0.1% for instruments bearing other residual risks)
LEARNINGS & FINDINGS

• **Significant change in market risk capital charge** ...
  In average, the market risk capital charge will change under FRTB (50% probability that the capital increase more than 18%)

• **... But with strong disparities between banks**
  If a majority of banks has a negative impact on their Basel 3 ratios, some others reported new capital charge that were lower than under current measures

• **FRTB risk measures with different kind of impacts**
  If the ES methodology seems to have beneficial impacts for banks, DRF methods have definitely negative impacts (conservative). It remains unclear for NMRF

• **Much more capital charge effects under the standard approach than the internally-modelled one.**
  One of the key objective of the FRTB seems to avoid bank to prefer standard methods (capital arbitrage)

• **Potential weaknesses in many bank risk measurement models**
  Because P&L attribution is an important component of the revised approach for assessing model performance, it will be a challenge to pass the tests (especially at a trading desk level)

The final FRTB impact simulation is not straight forward. It strongly depends on the size of the bank, the structure of its trading portfolios, its market risk factors

IMPACT ON CAPITAL CHARGES

From BIS – November 2015

(Simple mean calculation)

<table>
<thead>
<tr>
<th>Breakdown by risk factor</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRR</td>
<td>+4,7 %</td>
</tr>
<tr>
<td>Credit Spread</td>
<td>+41 %</td>
</tr>
<tr>
<td>Equity risk</td>
<td>+128 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breakdown by risk factor</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm. Risk</td>
<td>+90 %</td>
</tr>
<tr>
<td>FX Risk</td>
<td>+115 %</td>
</tr>
<tr>
<td>Others (IR, CS…)</td>
<td>+112 %</td>
</tr>
</tbody>
</table>

P&L attribution test

- **At a Bank level:** 88% pass the MS P&L test with the +10 / -10%
- **At a Desk level:** 41% pass the MS P&L test with the +10 / -10%
COMMENTS

- Despite introduction of new & punitive backtesting capital multiplier, decrease in LH and RW have led to a lower capital charge impact.
- Introduction of multiplier for 0-4 exceptions.
- Increase of multiplier for 5+ exceptions.

CHANGES BETWEEN BCBS 305 (12/2014) & BCBS 352 (14/01/2016)*

1. Capital Impact (%)

<table>
<thead>
<tr>
<th>Exception #</th>
<th>Capital Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>-19%</td>
</tr>
<tr>
<td>5+</td>
<td>-280%</td>
</tr>
<tr>
<td>Median Capital Increase</td>
<td>41%</td>
</tr>
<tr>
<td>Weighted Average Capital Increase</td>
<td>320%</td>
</tr>
</tbody>
</table>

2. Capital multiplier from backtesting results (IMA) - Exception #

<table>
<thead>
<tr>
<th>Exception #</th>
<th>BCBS 305 12/2014</th>
<th>BCBS 352 14/01/2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>1</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>7</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>8</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>9</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>10+</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* Additional impacts available in Appendices
The fresh Standards for Minimum capital requirements for market risk require lengthy infrastructure (process, system, organization) in order to comply with regulations before January 2019.

**Regulatory references**

- Minimum capital requirements for market risk – Standards, January 14th, 2016
  [http://www.bis.org/bcbs/publ/d352.pdf](http://www.bis.org/bcbs/publ/d352.pdf)
- Fundamental review of the trading book – Interim impact analysis, November 2015
  [http://www.bis.org/bcbs/publ/d346.pdf](http://www.bis.org/bcbs/publ/d346.pdf)
  [http://www.bis.org/bcbs/publ/d305.pdf](http://www.bis.org/bcbs/publ/d305.pdf)
  [http://www.bis.org/publ/bcbs265.pdf](http://www.bis.org/publ/bcbs265.pdf)
  [http://www.bis.org/publ/bcbs219.pdf](http://www.bis.org/publ/bcbs219.pdf)

**Quantitative & IT framework upgrade**
- Completely (re)think / (re)design / (re)build the whole IT infrastructure and architecture for more granularity and aggregation capabilities
- Invest on robustness, memory and flexibility:
  - computational time between 5x-20x
  - on-demand / parallel reporting and analytics
  - , ...

**Data storage, management and usage**
- Plan now for the organization, internal processes and developments necessary
- Since at least 1 full year of historical data is required for backtesting, a lot of the design and implementation shall be completed during 2016-2017

**Stricter quantitative procedures**
- Impose stricter model approval & usage guidelines and risk/liquidity indicators
- Set clear thresholds for breaches of P&L attribution and backtesting procedures
- Analyze Individual risk factor: price comparability & transparency, risk measure & aggregation (ES, IDR, SES)

**Some areas still need to be fine-tuned**

- Necessary agility of the FRTB setup to adapt to future regulatory changes namely on CVA, securitization, exemptions, Income Attribution calibration, capital requirement for credit risk/sovereigns...
- Difficulty in conducting multiple parallel projects

**FRTB implementation**

- Jan 2016 Framework finalized
- Dec 2017 1y data deadline
- Jan 2019 / Dec 2019 Go live

*Design, Build & Test*
Agenda

1. Context of the FRTB consultation – Evolution and revolution

2. CH&Co. Market research – How do market participants interpret the reform?
   1. The panel (Who are the participants?)
   2. The answers (What type of comments?)
   3. The opinions (What are the key issues?)

3. CH&Co. FRTB offer – Nature of interventions and edge

4. Appendices
FRTB CP3 Participants
From BIS – February 2015

26 participants

Banking Associations
- Australia
- Austria
- South Africa
- Brazil
- Canada
- China
- European Cooperative Banks
- France
- Germany
- Hong Kong
- ISDA, GFMA & IIF
- Japan
- Sweden

Banks
- Barclays
- Credit Suisse
- Deutsche Bank
- Goldman Sachs
- HSBC
- ING Bank
- KBC Bank

Solutions Providers
- Markit
- Sungard

Academics & others
- Karan Ahluwalia
- Kondor, Caccioli, Papp & Marsili
- Marc Henrard
- German Auto. Industry Association

LEARNINGS & FINDINGS

1. Banking Associations: Most of major banking associations have replied:
   - Comments highlighting big challenges and new constraints for the industry (Time, IT architecture, Organisation)
   - Comments on the lack of a wider impact assessment (Liquidity market, Emerging Market, P&L,...)
   - Comments identifying methodological weaknesses:
     - Risk sensitivity issues
     - Significantly overstated risk

2. Banks: Only few banks with significant trading books have replied:
   - All the banks have re-stated the comments formulated by their respective banking association,
   - Most of the time, they added specific comments related to their own constraints & portfolios
   - Some banks highlighted technical issues

3. Solution Providers: only two participants
   - Comments highlighting the impact of the new framework in terms of IT architecture, organisation, data and new calculation requirements

4. Academics & others
   - Essentially comments on theoretical & technical issues and inconsistency with FRTB CP3
FRTB Market Research
3 types of comments received on the FRTB by BIS

**COMMENTS RECEIVED BY BIS ON FRTB**
From BIS – February 2015

- Comments on FTRB
  - Received: >200 comments

1. **FRTB General Framework**
   - 35% of comments
   - LEARNINGS & FINDINGS:
     - Concerns raised about the impact of the framework on IT / Orga / Resources / Time frame / macroeconomic, ...
     - Data, IT architecture impact
     - Calibration of the framework and its non-assessed impact
     - Impacts on markets (liquidity, credit & equity markets, emerging markets)
     - Public disclosure
     - Desk segmentation
     - Complexity of the implementation
     - Backtesting / validation

2. **Standardized approach**
   - 40% of comments
   - LEARNINGS & FINDINGS:
     - Methodological issues and inconsistencies / risk sensitivity issues in the treatment of specific asset classes identified
     - Asymmetric correlation
     - Treatment of securitisations
     - Treatment of vega
     - Treatment of curvature risk
     - Treatment of basis risk
     - Interest rate sensitivity
     - Residual risk add-on
     - Treatment of sovereign bonds
     - Treatment of equity

3. **Internal Model Approach**
   - 25% of comments
   - LEARNINGS & FINDINGS:
     - Methodological issues identified
     - Eligibility tests
     - Expected Shortfall (ES) calculation
     - ES stability
     - Liquidity horizon
     - Non modellable Risk Factors
     - Treatment of sovereign bonds

**Types of comments**

- Potential impacts of FRTB (capital, costs, orga, market, ...)
- Methodological issues (theoretical, technical, ...)
The market…

...welcomes FRTB improvements and adjustments:

- **Boundary between the trading book and banking book**: based on management intention relying on more strict and objective criteria
- The “Cash Flow” based approach (BCBS265, Oct 2013) has been dropped in favour of the Sensitivity Based Approach (SBA)
- **Incremental Risk Charge** (‘IRC’) model is replaced by Incremental Default Risk (‘IDR’), Comprehensive Risk measure (‘CRM’) disappears, and the Correlation Portfolio moves to Standard Rules
- **Cross-asset class diversification** has been partially recognized
- **Liquidity Horizon** improvements:
  - Flexibility for banks to interpret the prescribed liquidity assignment as a ‘floor’
  - Extend on certain trading desks the horizons of specific risk factors (documented)
- The **time frame is tight** (update: new implementation deadline = Jan 19)
- More **impact simulation** needs to be done (Emerging markets, (P&L) attribution,...)
- **Impact in terms of IT architecture and organisation**:
  - More data and complex calculation requirements: FRTB we have to compute ES for each combination of 5 liquidity horizons x 6 asset classes x 3 calibration windows => up to 90 runs of ES for every desk || 10-day horizon ES with full revaluation
  - Impact these new requirement on Desk segmentation definition, IT architecture / analysis & reporting / public disclosure
- **Methodological issues: risk insensitive or significantly overstated risk**
  - IMA’s Non Modellable Risk Factors (NMRFs) and the SA’s Residual Risk Add-on (RRA) discouraging the critical function of prudent market risk hedging
  - Furthermore, Boundary between NMRFs and MRFs is too restrictive
  - ... see next slide
...agrees to say:

- Methodological issues: risk insensitive or significantly overstate risk
  - **Backtesting of Expected Shortfall**: not as straightforward as backtesting VaR. A number of methodologies have been proposed (time series of standard exceedance residuals,...)
  - The **SA will not be a credible fall-back to the IMA**, unless the calibration is improved
  - **Capital charges on sovereign bonds and equities** are inconsistent with the underlying risk
    - **Standardized approach**: Capital requirements for investment grade sovereign bonds and when a sovereign is downgraded
    - **Internal Model Approach**: 3bp floor on PD 1Y: Conservative calibration of the default risk charge (leads to 2.3x capital charges)
    - **Equity**: SA does not fully recognise hedging (leads to 4.6x capital charges)
  - **Securitized products** are treated punitively under the framework (leads to 2.2x capital charges)
  - **Treatment of basis risk**: The risk measure lack risk sensitivity and the resulting capital charge is overstated:
    - A granular well hedged portfolio has its capital charge floored at a high level;
    - The capital charge has a degree of proportionality to the number of risk factors.
  - **Treatment of vega**: difficulties to define and interpret a standardized Vega

...but certain points of contention remain

- **Big banks vs small banks**: tiered approach to cover the various business models and keep the complexity and costs reduced for small and medium sized banks and business models with no or very limited trading activity?
- **Methodological issues**
  - **VaR vs ES debate**: Failure of VaR to be sub-additive is almost never observed in practice
  - Proposal of prudential treatment relative to **Internal Risk Transfer (IRT)** operations between the banking book and trading book in not justified and too restrictive
Summary of estimated impacts from market participants
An increase of RWA capital charge and organizational complexities to streamline

Harmonization of methodologies and best practices coupled with technical, organizational, operational and system challenges will severely impact market RWA capital charges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>RWA impacts severity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. VaR → ES:</strong> 99% VaR / SVar to 97,5% Expected Shortfall</td>
<td>~ or &lt;</td>
</tr>
<tr>
<td><strong>2. IRC → IDR + migration risk in ES</strong></td>
<td>&gt;</td>
</tr>
<tr>
<td><strong>3. Stressed Capital charge (SES) for Non Modellable Risk Factors (NMRF)</strong></td>
<td>&gt;</td>
</tr>
<tr>
<td><strong>4. Liquidity Horizon number/length:</strong> from 10 to 10-250 days (25)</td>
<td>1x - 5x</td>
</tr>
<tr>
<td><strong>5. Liquidity Horizon scaling:</strong> from 1-day √10 to 10-day</td>
<td>&lt;</td>
</tr>
<tr>
<td><strong>6. Move from calculation on {Current + Stressed} observation period TO Stressed only</strong></td>
<td>½x - 1x</td>
</tr>
<tr>
<td><strong>7. 99% 1y VaR multiplier unchanged between 3 &amp; 4 for backtesting</strong></td>
<td>~ or &gt;</td>
</tr>
<tr>
<td><strong>8. Move back positions from the Banking Book to the Trading Book</strong></td>
<td>1x - 5x</td>
</tr>
<tr>
<td><strong>9. Leaner IT architecture (siloeed by approach, routing to appropriate calculation engine) with 1x-7x heavier computational effort, “on demand” analysis and reporting</strong></td>
<td>1x – 12x</td>
</tr>
</tbody>
</table>
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3. **CH&Co. FRTB offer – Nature of interventions and edge**
4. Appendices
CHAPUIS HALDER & CO.

CH&Co. statement of capabilities
A comprehensive yet specific offering

How we can help

1. Gap analysis & Benchmarking
   - Benchmark on market best practices leveraging our regulatory affairs breakfast club, participations to international conferences and our wide network of banks and regulators

2. Impact simulations
   - Provide decision-making solutions by simulating impacts, projecting strategic and business related items Risk modeling and quantification: comparative impact analysis between market risk IMA and SA approaches + Impact of FRTB new version

3. Model Design & validation
   - Risk modeling and quantification
   - Cartography and optimal validation process definition (Validation and documentation)

4. Action plan & Project follow up
   - Impact assessment on organization, models, processes and businesses
   - Project Management Office (PMO) to coordinate FRTB streams
   - IT framework rationalization: golden source, reorganization

5. IT framework design & data governance
   - IT diagnostic: as-is, target, opportunities for change, vendor benchmark
   - Data management optimal framework design

6. Optimization & capital / FRTB arbitrages
   - Assess cross-impacts & implement synergies: quantitative, IT, organization, process
   - Design optimal book structure, parallel runs, cost efficient processes

7. Support in strategic decisions
   - Provide decision-making solutions by simulating impacts, projecting strategic and business related items
   - Facilitate communication with Senior Management

Illustration

Sample projects

- Regulatory compliance and optimization projects: LCR, LR, NSFR...
- Business oriented white papers: IRRBB, B3 CVA...
- Computation, simulation, backtesting, documentation
- Technical / functional specifications, recommendations
- BCBS 239, other data management processes, LVA desk setup, ...
- RWA, LR, NSFR optimization leading to substantial and sustainable gains
- Multiple strategic plan design, with projections and support to create/revamp strategic functions
CH&Co. statement of capabilities
FRTB: where to start?

DIAGNOSTIC
Follow the minimum requirements

1. The Standards (BCBS 352) reference 200+ articles introducing both brand new requirements and evolutions
   - Define the portfolio profile / desk activities to detect areas of significant impacts on Capital Charge
   - Need to establish a “TO-DO” list with key demands & expected impacts (organizational / IT / process / quantitative)
   - Score each requirements according to a criticality grid (difficulty/priority to implement, synergies) and rank actions for a detailed implementation roadmap, leveraging what has been achieved so far

ACTIONS
Anticipate impacts & Reorganize some Market activity processes

2. Some requirements introduced by the Standards are very demanding in terms of computation, flexibility and data management capabilities of the IT framework
   - Need to audit the current architecture to assess the opportunity to design the most efficient and agile systems
   - Extend talks to encompass strategic changes initiated by the top management (“digitalization”, flexibility, user experience, robustness...)

360° VIEW / OPTIMIZATION
Optimization and rationalization with ongoing projects

3. On-board businesses and other departments (Product Control, financial control) into a joint reflexion and effort
   - Some areas are still underway of ongoing work with BIS (securitizations, CVA, sovereigns, IRR in the BB, exemptions, calibration of P&L attribution thresholds, ...): this require to conduct benchmark and quantitative analysis to pre-empt impacts on the organization
   - FRTB is a fantastic opportunity for business to take advantage of fine-tuned risk analytics
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1. Context of the FRTB consultation – Evolution and revolution

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   1. The regulatory “true” expectations
   2. Detailed comments received on the FRTB by BIS
   3. Detailed analysis on the FRTB proposals
Implicitly, the strengthening of the supervisory authorities’ power of control takes a new direction.

It can be defined by 6 major principles:

1. **The principle of comparability**
   
The new laws (Art. 78 for example) now include the possibility of retrospective control based on benchmarking. From this founding principle ensue other principles (mentioned below). Indeed, in order to make a comparison, other standards shall be required.

2. **The principle of standardization**
   
   Corep, Finrep, SREP ... Banking risks management from the regulator’s point of view is assessed automatically and homogeneously. The comparability exercised by banks among themselves will be all the more efficient.

3. **The principle de transparency**
   
The publication of internal methods (beyond the regulatory ratios) but also the complete review of all the chain of information (BCB2 239 in particular) must allow to reconstitute the detailed audit chain. The problem areas must therefore disappear.

4. **The principle of periodicity**
   
The durability of the model of legislative supervision is central to the issue. AQR exercises and stress testing shall be regularly carried out. Similarly, principles of rotation may occur (an internal method portfolio (IRBA) could go back, under certain conditions, to the STD method over a limited period of time...)

5. **Principles of centralization and extension of power of the supervisory authorities**
   
The role played by the national controlling authority is also strictly defined. The local room for manoeuvre will be reduced. Lobbying by banks will be all the more important (defending national specificities such as House Financing in France for example)

6. **The principle of sanction**
   
   A new form of possible sanctions, in particular by contributing additional provisions, own funds, by an increase of the supervisory staff, which no longer only results in a deviation from regulations but also in a difference from the market average.
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   3. Detailed analysis on the FRTB proposals
While significant improvements have been welcomed, major concerns still remain to address

<table>
<thead>
<tr>
<th>1</th>
<th>Specific calibration, if not adjusted that will have much higher capital charges than VaR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Better calibrate Liquidity Horizon</td>
</tr>
<tr>
<td></td>
<td>▪ Securitisation: the double count between the credit spread and default risk charges</td>
</tr>
<tr>
<td></td>
<td>▪ When multiple basis-type risks are aggregated</td>
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<tr>
<td></td>
<td>▪ Treatment of Equity: Not fully recognise hedging</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Specific calibration, if not adjusted will have much higher costs, in terms of IT, resources, organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Backtesting of Expected Shortfall models</td>
</tr>
<tr>
<td></td>
<td>▪ Desk segmentation definition and implications in terms of calculation / reporting / public disclosure</td>
</tr>
<tr>
<td></td>
<td>▪ More data and complex calculation leading to reshape the IT architecture and infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Impacts of FRTB implementation needs to be assessed accurately</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Macroeconomic impact assessment</td>
</tr>
<tr>
<td></td>
<td>▪ Liquidity market impact</td>
</tr>
<tr>
<td></td>
<td>▪ P&amp;L Impact assessment</td>
</tr>
<tr>
<td></td>
<td>▪ Emerging market impact</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>4</th>
<th>Further clarification is needed / insufficient risk sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Clarification: Treatment of Vega (correlation between vega exposures on different tenors; buckets definition to allocate vega risk positions;...)</td>
</tr>
<tr>
<td></td>
<td>▪ Insufficient risk sensitivity: Replacing the previously proposed Disallowance Factor (DF [90%]) with a correlation parameter (Correlation Method, CM [0.1%])</td>
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<tr>
<th>5</th>
<th>Methodological issues: Inconsistencies with other policies have been raised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Credit Risk Standards: default risk charges within the FRTB based on credit ratings</td>
</tr>
<tr>
<td></td>
<td>▪ Counterparty risk standards: final standards on counterparty risk (BCBS279) use fixed volatility assumptions and a type of Black-Scholes formula for the risk on options</td>
</tr>
</tbody>
</table>
## Comments received on the FRTB by BIS

### 1. FRTB General Framework: major concerns

<table>
<thead>
<tr>
<th>Key topics</th>
<th>Description</th>
<th>Type of challenges</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macro economic impacts</strong></td>
<td>- Negative impact of the proposed treatment and calibration of capital requirements and liquidity horizons, amongst others, on credit spreads for both sovereigns and corporates, as well as adversely impact equity markets</td>
<td>- Liquidity&lt;br&gt;- Market stability&lt;br&gt;- EM potential impact assessment</td>
<td>Deutsche Bank&lt;br&gt;GFMA, ISDA, IIF&lt;br&gt;Goldman Sachs</td>
</tr>
<tr>
<td></td>
<td>- Possible negative impacts of these proposals on liquidity in markets, price discovery, and hedging that is offered to end users of financial services.</td>
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<td></td>
<td>- Testing must include a macroeconomic impact assessment due to the high risk of capital allocation and adverse impacts on market liquidity</td>
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<td>- Emerging market impacts:</td>
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<td></td>
<td>- EM Sovereign debt issues will be broadly impacted across different maturities</td>
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<td></td>
<td>- Many emerging market regulators have not fully participated in this effort as their regulated firms do not have significant trading book exposures. However, international banks impacted by the FRTB provide market making support for these emerging market economies. Activity and market liquidity in emerging market securities may be substantially hampered if potential negative impacts are not fully understood</td>
<td></td>
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</tr>
<tr>
<td><strong>Data, IT architecture</strong></td>
<td>- Plan further rounds of targeted impact studies and should allow sufficient time for their completion. Because fundamental changes to their systems architecture calculation methodologies and data feeds in order to calculate its impact properly</td>
<td>- Costs constraints&lt;br&gt;- Time constraints&lt;br&gt;- Legacy constraints</td>
<td>Goldman Sachs&lt;br&gt;Accenture&lt;br&gt;GFMA, ISDA, IIF</td>
</tr>
<tr>
<td></td>
<td>- Additional Data to collect and process (sensibility / portfolio; SDT Approach data: correlation, diversification effect, longer historical data needs; increase in terms of volume; STD calculation &amp; IMM parallel runs;...)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Process &amp; governance: data reconciliations, Intra-desk transactions treatment</td>
<td></td>
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<tr>
<td><strong>Desk segmentation</strong></td>
<td>- Desk segmentation definition will have to take into account operational impacts:</td>
<td>- Time constraints&lt;br&gt;- IT Capacity</td>
<td>HSBC, Accenture</td>
</tr>
<tr>
<td></td>
<td>- Increasing number of runs to produce and validate</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Results publication and interpretation / desk Risk Charge (IDRC) will result in more harm than good: Public disclosure of desk-level information of this nature risks revealing confidential details about a firm ’s trading strategy that should be considered as proprietary information and may create noise and/or increased market volatility.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Comments received on the FRTB by BIS

### 2. Standardized approach: major concerns (1/2)

<table>
<thead>
<tr>
<th>Key topics</th>
<th>Description</th>
<th>Type of challenges</th>
<th>Source</th>
</tr>
</thead>
</table>
| Treatment of securitisation | - Significant impact on securitisation, a 2.2x increase in capital due mainly to the double count between the credit spread and default risk charges, as well as to the severe credit spread shocks. In many cases, the amount of capital exceeds the maximum potential loss, even for relatively senior tranches. | - Methodological issue  
- Risk sensitivity                                                | Nomura  
Deutsche Bank  
GFMA, ISDA, IIF |
| Treatment of Vega         | - Does not clearly specify what kind of vega has to be considered but we may guess Black volatilities should be taken  
- Vega risk positions for smile risk should be computed based on a regulatory projection procedure, projecting ATM vega risk positions on to three new risk factors: 80%*ATM, ATM, 120%*ATM”. We understand that all vega risk has to be projected, and not only ATM vega risk.  
- It is still not specified what is the correlation between vega exposures on different tenors (or maturity of the underlying).  
- One can understand that summing the standalone vega brick and the standalone delta brick leads to the same result as calculating a global GIRR by correlating delta and vega with (+1/-1): “The risk measures computed for each of them (delta and vega) are consequently gathered separately”, which is not all the time the case  
- The last CP3 version ( § III of the preamble, p.182) specifies a table of buckets in which we need to allocate vega risk positions: The separation between buckets is not clearly specified. For example, for a 5y exposure, we do not know if we need to allocate it to the bucket 6, to the bucket 7 or 50% to each of them.  
- We do not understand why the delta vertices table has not been reused for vega. We think that this new feature add some unnecessary complexity to the SBA. | - Methodological issue  
- Risk sensitivity                                                | FBF, HSBC, ING Direct  
Credit Suisse |
| Treatment of curvature risk | - The rationale for squaring the correlations in the case of curvature. In practice, the level of the parameter γbc used (i.e. 25%) is deemed to be too low and does not take into account diversification. Indeed, long gamma positions do not provide any benefits and even attract more capital charge in some situations than having only negative gamma positions. | - Methodological issue  
- Risk sensitivity                                                | FBF  
Credit Suisse |
### Treatment of basis risk

- **Description:** The treatment of basis risk via the disallowance factor should still be open for consideration, the generated charge should be not driven by volumes or result in cliff effects from small variation in portfolio risk composition.
  - Replacing the previously proposed Disallowance Factor (DF [90%]) with a correlation parameter (Correlation Method, CM [0.1%]). The DF is likely to be insufficiently risk-sensitive to provide a useful fall-back metric to the IMA, in particular for Rates and FX. However, we recognise the CM requires banks to compute sensitivities to all regulatory specified risk factors, which may not be as straightforward for some banks as for others.
  - The final capital charge can be very high (relative to current VaR models or the proposed IMA) where multiple basis-type risks are aggregated. This is because the sum of the cross terms in the SBA aggregation is effectively floored by the difference between the same-sign and opposite-sign correlation matrices. Thus the proposal to correlate same sign exposures at higher correlations to different sign exposures leads to unrealistic correlation matrices, whereby less correlated exposures are attributed higher correlation factors. This problem becomes much more severe with the change from Disallowance Factor to Correlation Method for basis risk, both because of the wider range of positions affected, and because the high (99% or 99.9%) correlations between matched positions where the only net exposure is to a (small) basis. To give an extreme example, the combined capital charge for two matched cash-CDS basis positions on different names in the same bucket could be as much as 17 times the equivalent charge for two positions in different buckets (where symmetric correlation is used).

### Residual Risk Add-on (RRA)

- **Description:** The SA’s Residual Risk Add-on (RRA) accounts for 47% of total market risk capital under the SA. The scope and methodology for calculating these add-on charges discourages the critical function of prudent market risk hedging.

### Treatment of equity

- **Description:** The SA does not fully recognise hedging and leads to capital charges 4.6 times higher than results under the IMA. This outcome results in a substantial disconnect between economic risk and regulatory capital, and can create perverse risk management incentives as common market risk hedges such as options, futures and forwards are not recognised.

<table>
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<tbody>
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<td>Deutsche Bank, Barclays</td>
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<td>GFMA, ISDA, IIF</td>
</tr>
</tbody>
</table>
## Comments received on the FRTB by BIS

### 4. Internal Model Approach: major concerns (1/2)

<table>
<thead>
<tr>
<th>Key topics</th>
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<th>Source</th>
</tr>
</thead>
</table>
| Liquidity Horizon           | - Better calibrate Liquidity Horizon as the incremental capital charge seems to be excessive (factor of 5) for certain product categories  
- We clearly would like to avoid the situation when prudent valuation adjustments, which include also illiquidity adjustments, are calculated differently for different portfolios.  
- Since prudent valuation is based on accounting categories, while trading book is not linked to trading assets / liabilities explicitly, the differentiation in illiquidity charges will create unnecessary difficulties and confusions. It is also necessary to underline that principles behind illiquidity risk treatment under the market risk framework as well as under the prudent valuation requirements should be the same – otherwise the shift of positions between banking and trading book (if it is happening) will lead to indirect capital benefits.  
- Ensure liquidity horizons (LHs) are sufficiently granular and risk-sensitive. The current liquidity horizon calibration, still relies on risk factor buckets which are too long and overstate the underlying level of risk. Long LHs will mean the inventory of certain business lines, such as corporate bond credit flow desks, may become uneconomic  
- Need for clarification on the treatment of offshore equivalent currencies. For example, USD/CNY is defined as liquid. It would then be expected that USD/CNH (renminbi deliverable in HK) and USD/CNT (renminbi deliverable in Taiwan) are equivalently liquid  
- The horizons be treated as “floors”, with basis/correlation risks calculated over the longer horizon: it may result in different treatment for the same risk factor across different desks, and some practicalities require further clarification, e.g. do we maintain desk level floors for firmwide ES and “partial” ES calculations? | - Macro eco impact  
- Methodological issues  
- Calibration  
- Capital charges                                                                 | Deutsche Bank  
Barclays  
Austrian Federal Economic Chamber  
HSBC  
ING Direct  
Credit Suisse                                                                 |
| Non modellable Risk Factors | - Provisions focussed on data quality in models are better suited to achieving the stated regulatory aims of a more robust risk factor identification and measurement process, than a framework that attempts to define model eligibility of risk factors based on loosely defined concepts of “representative transactions”, “real” prices, and “acceptable frequency” (of observations).  
- In/out criteria proposed of “24 observations per year with a maximum period of one month between consecutive transactions” is likely to result in a lot of operational pain and increased costs, with very little gain in terms of model coverage and/or data quality | - Methodological issues                                                                                     | GFMA, ISDA, IIF  
Barclays  
Credit Suisse                                                                 |
## Comments received on the FRTB by BIS

### 5. Internal Model Approach: major concerns (2/2)

<table>
<thead>
<tr>
<th>Key topics</th>
<th>Description</th>
<th>Type of challenges</th>
<th>Source</th>
</tr>
</thead>
</table>
| **Expected Shortfall**      | - Full revaluation can be achieved by approaches that capture curvature “such as grid-based methods”. We are seeking confirmation that Taylor expansions could as well be considered as appropriate approaches for full revaluation as long as it can be demonstrated that curvature risk is appropriately captured.  
  - The CP3 grants flexibility for banks to interpret the prescribed liquidity assignment as a ‘floor’, or in other words to extend on certain trading desks the horizons of specific risk factors. Nonetheless, the ‘floor’ introduces additional complexity into the ES computation, since the liquidity set up is no longer to be done at the risk factor level but at the (risk factor x desk) level. For instance, while computing the portfolio-wide ES, no risk factor with 20-day liquidity should contribute to the third term ES3, except for positions belonging to trading desks where an extension is deemed necessary. Working with multiple set up simultaneously will add to technical complexity and increase operational risks, whilst implementation will become less transparent to risk controllers and supervisors.  
  - We disagree with the statements "more stable model output" and "less sensitive to extreme outlier observations" - VaR has these properties, as quantiles are not greatly affected by extreme tail behaviour; ES, however, is likely to be influenced to a non-trivial degree by both outliers and tail distribution assumptions. (Except if the period of returns used for calculation is kept constant in a stressed ES setting.)  
  - For instruments priced by full valuation, the decomposition of ES by risk class is not possible as a single P&L is obtained which combines all the underlying risk factors. Thus, to allocate the P&L of each instrument under a specific asset class, banks employing full-valuation must employ several assumptions which can potentially lead to different treatments for the same instrument. The only way to achieve a P&L breakdown by risk class is to use a sensitivity-based decomposition which is currently not permitted. | Methodological issues             | FBF, Barclays, Austrian Federal Economic Chamber, European Association of Co-operative Banks (EACB), HSBC |
| **Economic impact**         | - Only a limited number of banks have been able to contribute data to the Basel Committee for the P&L attribution test. Therefore the impacts of the test to internal model validation are unknown at this stage and further analysis is required to ensure proper calibration of the framework | P&L potential impacts             | GFMA, ISDA, IIF |
Agenda

1. Context of the FRTB consultation – Evolution and revolution

2. CH&Co. Market research – How do market participants interpret the reform?

3. CH&Co. FRTB offer – Nature of interventions and edge

4. Appendices
   1. The regulatory “true” expectations
   2. Detailed comments received on the FRTB by BIS
   3. Detailed analysis on the FRTB proposals
FRTB proposals centred around 5 main innovations on process and metrics
1. Changes to the Trading Book boundary

### FRTB proposal
- FRTB precise transfer conditions between these two portfolios, reducing regulatory arbitrage opportunities

### Why is it required?
- The regulatory difference of treatment may induce arbitrage (RWA optimization) between the banking book and the trading book operations in order to benefit from lower capital charges under stress.

  → *This means banks may inadequately assess their risks and associated capital cover.*

### Impacts on the organization
- An authorization procedure and transaction routing between books seems necessary:
  - an evaluation process of eligibility for the transfer
  - a backup of the audit trail of this workflow (for internal use and regulator)
  - integration of workflow management mandates for new instruments to clarify and ensure that risk in the target book can be managed

- Necessary implementation of a regulatory reporting procedure of positions and their assignments between Trading / Banking book

- Potential Internal Risk Transfers (IRT)

- For an effective monitoring, this segregation must be aligned with the internal risk management practices and may leverage a dynamic asset/payoff/performance mapping

### Example
- Asset bought for trading purposes with associated risks held in the TB would attract 8% capital cover requirement.
- Market moves against that asset with less chance of liquidating it at a profit
- Transfer to the BB (longer-term holdings) and attract the lower 1.6% capital cover requirement

### Outstanding issues
- Prudential classification criteria – hierarchy
  1. Trading intent / risk mandate
  2. Presumption criteria (pre-defined list of instruments)
  3. Trading position goes into the TB

  → Hierarchy is not finalized (not clear, contradictory)
  → Presumptions legitimacy in question
  → *Trading intent shall prevail*
FRTB proposals centred around 5 main innovations on process and metrics

2. Market Liquidity Horizons & diversification under the internal model approach

<table>
<thead>
<tr>
<th>FRTB proposal</th>
<th>Why is it required?</th>
<th>Impacts on the organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• FRTB recommends bucketing risk factors by liquidity horizons under the internal model approach: the longer the horizon, the greater the RWA and associated capital required</td>
<td>• Risk factors are not all equally liquid, depending on the asset class they belong to</td>
<td>• Liquidity horizons buckets are conservative and lack granularity: “digital” effect. This can induce banks to exit some activities and may in turn reduce market liquidity</td>
</tr>
<tr>
<td>• Full revaluation (no proxies permitted) for each liquidity horizon ES</td>
<td>• Introduction of liquidity horizons, defined as the time required to execute transactions that eliminate exposure to a risk factor, without changing the price of hedging instruments in stressed market conditions</td>
<td>• Necessary flexibility of Risk Management system to segment instruments and calculate the risks at different liquidity horizons</td>
</tr>
<tr>
<td>• Diversification introduced via the ES calculation (+ correlation matrix)</td>
<td>→ Liquidity horizons are a business issue because the capital needs are determined indirectly by the traded assets (for instance credit very expensive).</td>
<td>• Choose the most adequate calibration:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Apply scaling factor to daily market moves for ease of implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Apply similar liquidity horizons to all risk factors of the same asset class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Apply regulatory liquidity horizons by risk factor, based on a historical calibration</td>
</tr>
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<td></td>
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<td>– Apply regulatory liquidity horizons prescribed by the regulator</td>
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<tr>
<td></td>
<td></td>
<td>• Challenge to manage portfolios with multiple liquidity horizons and maintain consistency across them (computation, data input)</td>
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<tr>
<td></td>
<td></td>
<td>• Risk appetite and business model impact since organization can realign business lines towards more RWA friendly operations</td>
</tr>
<tr>
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<td>• Under the internal model approach, diversification benefits between asset classes are expected to some extent</td>
</tr>
</tbody>
</table>

Example

Overly conservative liquidity horizons:

**Large cap liquidity horizons**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity price</td>
<td>10</td>
</tr>
<tr>
<td>Equity volatility</td>
<td>20</td>
</tr>
<tr>
<td>Credit spread</td>
<td>120</td>
</tr>
<tr>
<td>Credit spread volatility</td>
<td>250</td>
</tr>
</tbody>
</table>

Liquidity horizons:

\[
ES = \sqrt{ES_T(Q_1) \left( \frac{LH_1}{T} \right)^2} + \sum_{j=1}^{n} \left( ES_T(Q_j) \frac{(LH_j - LH_{j-1})}{T} \right)^2
\]
FRTB proposals centred around 5 main innovations on process and metrics

3. Move from VaR measurement to Expected Shortfall

### FRTB proposal
- Expected Shortfall (with a 97.5% confidence level) to replace the VaR (with a 99% confidence level) to account for extreme risks, thus including indirectly VaR and SVaR
- Calibration in stress conditions for a reduced set of risk factors, which explains at least 75% of the ES.
- Split of the Incremental Risk Charge (IRC) into the Incremental Default Risk (IDR) charge for non-securitization credit position and the integration of migration risk into the integrated measurement of market risk through the volatility of credit spreads

### Why is it required?
- VaR did not appropriately capture tail risk
- VaR does not have the desirable property of sub-additivity whereas ES does.
- VaR and SVaR production can be rationalized into one process
  - ES facilitate risk measurement at both granular and aggregated levels for both normal and extreme market conditions as well as a precise diversification benefit assessment
- Practical challenges of joint modeling of discrete (default risk) and continuous (spread risk) component of credit risk, and a large source of variation in market RWA

#### Example
- ES measure satisfies, VaR does not: $\text{RISK} (A+B) < \text{RISK} (A) + \text{RISK} (B)$

<table>
<thead>
<tr>
<th>Example</th>
<th>1Y 99%VaR</th>
<th>1Y 99%ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value A</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Value B</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Value A + Value B</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>Value (A + B)</td>
<td>55</td>
<td>75</td>
</tr>
</tbody>
</table>

### Impacts on the organization
- Set an analysis framework with ES contributions by risk factor: Analyse the relative contributions of risk factors in ES, incl. stress periods.
- Investing more in data collection and management to ensure the quality of the historical data used
- Keep a conservative approach and run in parallel VaR, SVaR and ES for transparency and consistency with prevailing market conditions (for a standard Gaussian distribution, 99% VaR is approximately equal to 97.5% ES). ES is difficult to back-test.

### Outstanding issues
- Effective back-testing of the ES ("not an elicitable measure"): what to back-test ES against?
- Calibration of default correlation?
- IDR is incremental: how to account for risks already capitalized in the ES?
FRTB proposals centred around 5 main innovations on process and metrics

4. Reinforce P&L attribution checks & parallel run model-based Vs. standard approaches

**FRTB proposal**

- Extensive use of Income attribution methodologies and 2 ways to evaluate the performance of models:
  - **MS P&L test value**: Mean of differences between the trading P&L (hypothetical P&L) and risk P&L (theoretical P&L) over volatility of the hypothetical P&L
  - **VV P&L test value**: Variance of unexplained P&L (theoretical P&L - hypothetical P&L) over hypothetical P&L variance

- Where capital charge is calculated using the internal approach, FRTB recommends a parallel run shall be maintained with the standard approach to cope with model risk in stressed periods

**Why is it required?**

- Differences between hypothetical P&L and Theoretical P&L may indicate potential weaknesses of risk monitoring models.

  → **Additional measures as well as a closer monitoring of risks and associated P&L is necessary to assess model performance**

- Increased model risk can emerge from the internal model approach in stressed periods. Regulator prefers a fall-back to the standard approach with an additional capital charge

**Impacts on the organization**

- Extend existing P&L attribution framework with new metrics can improve P&L monitoring and accuracy
- It would be interesting to compare these metrics to the P&L variance ratio (introduced in Prudent Value regulation)
- Challenge to maintain systems able to cope with parallel runs for the internal and standard approach capital charge calculation. Include modules to periodically validate the soundness and stability of the model-based approach. This allows, in case of proven risk (and therefore prohibition of internal approach use) to use the standard approach (with capital surcharge).

**Example**

- Theoretical P&L based on PV01 risks may mismatch with hypothetical P&L as 2nd order Greeks are not included in the Income Attribution checks
- Classic checks may lack qualitative view on misbooking or curve/skew/correl ... remarking

**Outstanding issues**

- Cope with “non-modellable” risk factors (insufficient frequency, historical data series) and incorporate into the IA and ES
### FRTB proposals centred around 5 main innovations on process and metrics

#### 5. Data management and IT infrastructure: a revolution in complexity

<table>
<thead>
<tr>
<th>FRTB proposal</th>
<th>Why it is required?</th>
<th>Impacts on the organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>- FRTB requires that a bank is able to automatically generate accurate, reliable and auditable risk data over the value chain to minimize the likelihood of errors</td>
<td>- Data granularity insufficient to fully capture risk in portfolios. Conversely, data aggregation introduced imperfections in risk measurement since risks are not all additive</td>
<td>- Complete review/upgrade/deployment of risk management systems to cope with both internal and standard approach (liquidity horizons, ES, IA, ...), supported by an efficient data management policy (volumes, depth...) and robust calculation engines (increased # runs/simulations, longer timeseries, ...)</td>
</tr>
</tbody>
</table>
| - Banks are required by the FRTB to compute their capital requirements in accordance with the standardized approach:  
  - Compute sensitivities on all positions;  
  - Fully reprice all options twice for every underlying risk factor;  
  - Compute jump-to-default risk for relevant instruments;  
  - Perform aggregation under three sets of correlations | - Risk data must be available at granular and aggregated levels to be managed appropriately | - Banks must be able to develop capacity to produce "on demand" risk analysis whether for risk measurement, control or monitoring (significant transaction, management request, detailed analysis, internal recommendation...) or required by the regulator (QIS, recommendation, impact analysis,...). |
| - Banks may choose to also compute these capital covers according to the internal approach: This means that for a number of banks two processes will be run in parallel | - The ability to aggregate information at the book, desk, and business line is crucial for risk & capital usage analysis and regulatory reporting | - The same goes for reporting capabilities. |

#### Example

- In the latest QIS, one bank specified that it had to increase the number of its daily processes to compute internal model capital requirements from 5 to 70

#### Outstanding issues

- Since the final FRTB rules have not been clarified yet, uncertainty affect IT Infrastructure changes:
  - Assessment of the attractiveness / RWA cost trade-off of the internal models approach over the standardized
  - uncertainty surrounding the potential introduction of capital floors based on the standardized approach + changes in risk weights (cf. vega)
Agenda

1. Context of the FRTB consultation – Evolution and revolution

2. CH&Co. Market research – How do market participants interpret the reform?

3. CH&Co. FRTB offer – Nature of interventions and edge

4. Appendices
   1. The regulatory “true” expectations
   2. Detailed comments received on the FRTB by BIS
   3. Detailed analysis on the FRTB proposals
   4. What has changed between BCBS 305 (12/2014) and BCBS 352 (14/01/2016)
Incorporating the risk of market illiquidity in the internal models approach

<table>
<thead>
<tr>
<th>Asset class</th>
<th>Liquidity horizon for Risk factor</th>
<th>BCBS 305 12/2014</th>
<th>BCBS 352 14/01/2016</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates</td>
<td>Yield curve G7</td>
<td>10</td>
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<tr>
<td></td>
<td>Bank's domestic CCY</td>
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<tr>
<td></td>
<td>Yield curve (Others)</td>
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<td></td>
<td>ATM Vol</td>
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<tr>
<td></td>
<td>Others</td>
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<tr>
<td>Credit</td>
<td>Credit spread (SOV/IG)</td>
<td>20</td>
<td>20</td>
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<tr>
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<td>Credit spread (SOV/HY)</td>
<td>60</td>
<td>40</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Credit spread (CORP/IG)</td>
<td>60</td>
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<td>33%</td>
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<td></td>
<td>Credit spread (CORP/HY)</td>
<td>120</td>
<td>60</td>
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<tr>
<td></td>
<td>Credit spread structured (cash &amp; CDS)</td>
<td>250</td>
<td>120</td>
<td>52%</td>
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<tr>
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<td>Credit spread vol*</td>
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<td>52%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>250</td>
<td>120</td>
<td>52%</td>
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<td>Equity</td>
<td>Price (Large cap)</td>
<td>10</td>
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<td>0%</td>
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<tr>
<td></td>
<td>Price (Small cap)</td>
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<td>0%</td>
</tr>
<tr>
<td></td>
<td>Vol (Large cap)</td>
<td>20</td>
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<td>0%</td>
</tr>
<tr>
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<td>Vol (Small cap)</td>
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<td>50%</td>
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<td>FX rate (Liquid CCY pairs)</td>
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<td>FX rate (Other)</td>
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<td>0%</td>
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<tr>
<td></td>
<td>Vol</td>
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<td>40</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>60</td>
<td>40</td>
<td>33%</td>
</tr>
<tr>
<td>Commodities</td>
<td>Energy (Price)</td>
<td>20</td>
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<tr>
<td></td>
<td>Carbon emissions (Price)*</td>
<td>60</td>
<td>20</td>
<td>67%</td>
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<td>Precious metals (Price)</td>
<td>20</td>
<td>20</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Non ferrous metals (Price)*</td>
<td>60</td>
<td>20</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Other (Price)</td>
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<td>0%</td>
</tr>
<tr>
<td></td>
<td>Energy (Vol)</td>
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<td>0%</td>
</tr>
<tr>
<td></td>
<td>Carbon emissions (Vol)*</td>
<td>120</td>
<td>60</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Precious metals (Vol)</td>
<td>60</td>
<td>60</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Non ferrous metals (Vol)*</td>
<td>120</td>
<td>60</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Other (Vol)</td>
<td>120</td>
<td>120</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>120</td>
<td>120</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Category that did not exist before

Comments

- Only LH improvements
- Introduction of a new liquidity horizon: 40
- Removal de facto of the 250days LH category
- All asset classes affected except Rates and Commodities
Residual risk charge comparison

<table>
<thead>
<tr>
<th></th>
<th>BCBS 305 12/2014</th>
<th>BCBS 352 14/01/2016</th>
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<tr>
<td>Exotics</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Other residual risks</td>
<td>1.0%</td>
<td>-0.9%</td>
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<tr>
<td>Exotics</td>
<td>0.1%</td>
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</tbody>
</table>

Comments

- “Other residual risks” impacted only
### Risk weights (1/2)

#### GIRR Risk weights per vertex (in basis points)

<table>
<thead>
<tr>
<th>Tenor</th>
<th>BCBS 305 12/2014</th>
<th>BCBS 352 14/01/2016</th>
<th>Change (abs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,25y</td>
<td>160</td>
<td>240</td>
<td>-80</td>
</tr>
<tr>
<td>0,5y</td>
<td>160</td>
<td>240</td>
<td>-80</td>
</tr>
<tr>
<td>1y</td>
<td>150</td>
<td>225</td>
<td>-75</td>
</tr>
<tr>
<td>2y</td>
<td>125</td>
<td>188</td>
<td>-63</td>
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<tr>
<td>3y</td>
<td>115</td>
<td>173</td>
<td>-58</td>
</tr>
<tr>
<td>5y</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>10y</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>15y</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>20y</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>30y</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>Inflation</td>
<td>150</td>
<td>225</td>
<td>-75</td>
</tr>
</tbody>
</table>

#### CSR (non-securitisation) Risk weights per vertex (in basis points)

**IG**
- Sovereigns including central banks, multilateral development banks: 250 (50 increase)
- Local government, government-backed non-financials, education, Public administration: 500 (100 increase)
- Financials including government-backed financials: 200 (0 increase)
- Basic materials, energy, industrials, agriculture, manufacturing, mining and quarrying: 1000 (300 increase)
- Consumer goods and services, transportation and storage, administrative and support service activities: 350 (300 increase)
- Technology, telecommunications: 300 (100 increase)
- Health care, utilities, professional and technical activities: 250 (100 increase)
- Covered bonds: 200 (200 increase)

**HY/NR**
- Sovereigns including central banks, multilateral development banks: 1200 (300 increase)
- Local government, government-backed non-financials, education, Public administration: 900 (1200 increase)
- Financials including government-backed financials: 400 (800 increase)
- Basic materials, energy, industrials, agriculture, manufacturing, mining and quarrying: 1000 (700 increase)
- Consumer goods and services, transportation and storage, administrative and support service activities: 900 (850 increase)
- Technology, telecommunications: 600 (550 increase)
- Health care, utilities, professional and technical activities: 1200 (500 increase)

#### CSR (Securitisation - CTP) Risk weights per vertex (in basis points)

**IG**
- Sovereigns including central banks, multilateral development banks: 489 (400 increase)
- Local government, government-backed non-financials, education, Public administration: 400 (400 increase)
- Financials including government-backed financials: 839 (800 increase)
- Basic materials, energy, industrials, agriculture, manufacturing, mining and quarrying: 556 (400 increase)
- Consumer goods and services, transportation and storage, administrative and support service activities: 499 (300 increase)
- Technology, telecommunications: 347 (200 increase)
- Covered bonds: 320 (600 decrease)

**HY/NR**
- Sovereigns including central banks, multilateral development banks: 1565 (1300 increase)
- Local government, government-backed non-financials, education, Public administration: 1659 (1300 increase)
- Financials including government-backed financials: 1201 (1600 increase)
- Basic materials, energy, industrials, agriculture, manufacturing, mining and quarrying: 1472 (1000 increase)
- Consumer goods and services, transportation and storage, administrative and support service activities: 1211 (1200 increase)
- Technology, telecommunications: 897 (1200 increase)
- Health care, utilities, professional and technical activities: 1659 (1200 increase)

**Other sector**
- Other sector: 1200 (1200 increase)
### Risk weights (2/2)

#### GIIR Risk weights per vertex (in basis points)

<table>
<thead>
<tr>
<th>Category</th>
<th>Senior IG</th>
<th>Non Senior IG</th>
<th>HY/NR</th>
<th>Other sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CSR (Securitisation - CTP) Risk weights per vertex (in basis points)</strong></td>
<td>RMBS – Prime</td>
<td>RMBS – Prime</td>
<td>RMBS – Prime</td>
<td>Other sector</td>
</tr>
<tr>
<td>RMBS – Prime</td>
<td>800</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>RMBS – Mid-Prime</td>
<td>800</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>RMBS – Sub-Prime</td>
<td>800</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>CMBS</td>
<td>800</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>ABS – Student loans</td>
<td>1300</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td>ABS – Credit cards</td>
<td>900</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
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<tr>
<td>ABS – Auto</td>
<td>900</td>
<td>3000</td>
<td>3000</td>
<td>5000</td>
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<tr>
<td><strong>CLO non-correlation trading portfolio</strong></td>
<td>1300</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
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<tr>
<td><strong>Equity Risk weights per vertex (in basis points)</strong></td>
<td>EM economy - Consumer goods and services, transportation and storage, administrative and support service activities, healthcare, utilities</td>
<td>55</td>
<td>55</td>
<td>0</td>
</tr>
<tr>
<td>EM economy - Telecommunications, industrials</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>EM economy - Basic materials, energy, agriculture, manufacturing, mining and quarrying</td>
<td>45</td>
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<tr>
<td>EM economy - Financials including government-backed financials, real estate activities, technology</td>
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<tr>
<td>Adv. economy - Consumer goods and services, transportation and storage, administrative and support service activities, healthcare, utilities</td>
<td>30</td>
<td>30</td>
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<tr>
<td>Adv. economy - Telecommunications, industrials</td>
<td>35</td>
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<tr>
<td>Adv. economy - Basic materials, energy, agriculture, manufacturing, mining and quarrying</td>
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<td>Adv. economy - Financials including government-backed financials, real estate activities, technology</td>
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<td><strong>Small</strong></td>
<td>EM economy - All sectors described under bucket numbers 1, 2, 3 and 4</td>
<td>70</td>
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<tr>
<td><strong>Other sector</strong></td>
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<tr>
<td><strong>Energy</strong></td>
<td>Energy - Solid combustibles</td>
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</tr>
<tr>
<td>Energy - Liquid combustibles</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Energy - Electricity and carbon trading</td>
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<td>6000</td>
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<tr>
<td>Freight</td>
<td>8000</td>
<td>8000</td>
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<td></td>
</tr>
<tr>
<td>Metals - non-precious</td>
<td>4000</td>
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<tr>
<td>Gaseous combustibles</td>
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<tr>
<td>Precious metals (including gold)</td>
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<tr>
<td>Grains &amp; oilseed</td>
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<tr>
<td>Livestock &amp; dairy</td>
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<td>Softs and other agriculturals</td>
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<tr>
<td>Other commodity</td>
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