## The Art of Regulation: A case of the Fundamental Review of the Trading Book revisited

Alexey Lobanov, Ph. D., FRM

Deputy Director Banking Regulation Department Bank of Russia

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The views and opinions expressed herein are those of the author and do not necessarily reflect the official position of the Bank of Russia

# **Outline**

- 1. Art, science and financial regulation.
- 2. Fundamental review of the trading book accomplished: a piece of art?
- 3. Quantitative impact study and calibration of the revised market risk capital rules: putting the cart before the horse?
- 4. Q & A

# Why FRTB again?

#### As an epigraph

"Though I turn, I fly not – I cannot depart; I would try, but try not To release my heart. And my hopes are dying While, on dreams relying, I am <u>spelled by art</u> ..."

> "To Miss Louisa Olivia Hunter" February 14, 1847



Edgar Allan Poe, (1809 – 1849) American writer, poet, and critic

# Art, science and financial regulation

#### Main differences between art and science

Art	Science
Subjective	Objective
Esthetic	Reason (truth)
Beauty	Knowledge
Intuition (dream)	Precision
Uniqueness (self-expression)	Veracity (proof)
Experiment	Experiment to validate a theory
Creating fictitious world	Predicting the future of the real world

Now let's look at the regulation through an art's lens!



## Edgar Allan Poe, "Philosophy of Composition" (1846) or "The Raven" reverse-engineered

- 1. Extent (length): the limit of a single sitting, brevity with a certain degree of duration (about 100 lines for a poem)
- 2. Impression (effect): universally acceptable contemplation of the beautiful, intense and pure elevation of soul
- 3. Tone: sadness, melancholy (e.g. death of a beautiful woman)
- 4. Sense of identity: repetition, refrain
- 5. Originality: no impulse or intuition!
- 6. Totality, or unity of effect
- ⊕ Some amount of complexity, or adaptation
- Generation Some amount of suggestiveness some undercurrent, however indefinite, of meaning







#### **Revised Standardized Approach: an overview**

- ü To be used by default by all banks, supervisory approval not required
- ü "Capital floor" for banks using revised IMA
- "Credible fallback" for trading desks/banks reverting from revised IMA to revised SA by the supervisor
- **ü** The only approach allowed for securitization exposures
- **ü** Revised SA is based on banks' own estimates of price sensitivities to risk factors





## Revised Standardized Approach: linear and non-linear risks

## Ü Delta risk

- Price change of an instrument resulting from a specified change (1 bp or 1%) in the underlying risk factor (five risk classes: interest rates, FX rates, stock prices, commodity prices, and credit spreads)
- Ü Vega risk
  - Change in the value of the option or an instrument with optionality resulting from a change in the price volatility of the underlying risk factor

Delta risk and vega risk for all risk classes are measured based on internal estimates of linear sensitivities of an instrument's price to specified small changes in its underlying risk factors



## Revised Standardized Approach: linear and non-linear risks

- Ü Curvature Risk
  - Price change of an option by more than delta given a small change of the underlying risk factor
- Curvature risk is estimated based on full repricing of the instrument under two scenarios: an upward and a downward changes in the price of the underlying
- For the worst of the two scenarios, subtracting price change explained by delta yields curvature risk
- Curvature risk is added up to delta risk and vega risk



### **Revised Standardized Approach: risk aggregation**

- 1. Each of 5 risk classes is decomposed into pre-specified buckets that:
  - Group together broadly similar risks within a risk class (e. g., the general interest rate risk class has buckets for 0.25 year, 0.5 year, 1 year, 2 years, 3 years, 5 years, 10 years, 15 years, 20 years, and 30 years)
  - Assign a fixed risk weight (approximately equal to a 97.5% expected shortfall (ES) over a specified liquidity horizon)
- 2. Delta, vega and curvature risks are mapped to relevant risk classes and risk factors
- 3. For delta, vega, and curvature the net sensitivity for each position in a bucket is multiplied by the specified risk weight
- 4. The risk-weighted delta, vega and curvature sensitivities for the positions in a bucket are aggregated using pre-specified correlations to account for diversification
- 5. The risk-weighted delta, vega and curvature risk positions for each bucket within a risk class are aggregated using pre-specified correlations to arrive at the total delta, vega, and curvature risk for each risk class



#### **Revised Standardized Approach: risk aggregation**



Example: equity risk class



#### **Revised Standardized Approach: risk aggregation**





### **Revised Standardized Approach: default risk**

- Default risk charge is calculated for debt and equity instruments
- Default risk is measured as *fair value less recovery* determined using LGDs specified under the Foundation IRB Approach (jump to default (JTD) loss amounts)
- Debt and equity instruments (except securitizations) are assigned to sovereign, municipal or corporate buckets
- Securitization instruments are assigned to buckets and risk weights specified in the "Revisions to the Securitisation Framework" (BCBS 2014a)
- Each bucket's capital charge is the difference between risk-weighted net long and short JTD amounts multiplied by a ratio < 50% to limit the recognition of hedging relationship between long and short positions



## **Revised Standardized Approach: residual risk**

- Residual risk is calculated for instruments whose price changes cannot be well approximated based on price sensitivities
- The residual risk is the notional amount of an instrument bearing residual risk multiplied by
  - 1.0% for instruments with an exotic underlying (e.g. *spread options, weather derivatives*)
  - 0.1% for instruments bearing other residual risks (e.g. *mortgage-backed securities*)
- The residual risk add-on is the sum of all residual risks in the trading book



	Risk Classes			Other risks			
Instrument	GIRR	FX	Equity	Commodity	Credit spread	Default	Residual
FX bond	Delta	Delta			Delta	ü	
FX forward	Two Deltas	Delta					
Option on equity in foreign currency		Delta	Delta Vega Curvature			ü	
Spread option on natural gas				Delta Vega Curvature			ü
Mortgage- backed security	Delta				Delta	ü	<b>Ü</b> prepay- ment risk

#### **Revised Standardized Approach: examples**



## **Revised internal Models Approach**

- Change of risk measure to capture tail risks: ES instead of (VaR + Stressed VaR)
- ES calibrated on a stressed period to reduce procyclicality
- Accounting for *market liquidity risk* with varying liquidity horizons instead of a single 10-day liquidity horizon
- Constraints on diversification benefits across five risk classes
- Assessment of internal models through tests at the desk level (if failed, the desk reverts to revised SA)
  - Daily VaR (!) backtesting (methodology for backtesting ES under development)
  - P&L attribution test (risk factors and proxies must explain correctly daily P&L)
- Capital charge for non-modelable risk factors (e. g. markets with sparse price history)
- Replacement of incremental risk charge (IRC) with a default risk charge
- Securitization instruments are no longer eligible for revised IMA



#### Determining eligibility of trading activities for the internal models-based approach





#### **QIS and calibration results for non-securitization exposures**





#### **QIS and calibration results for securitization exposures**



\*QIS 1<sup>st</sup> half 2015 did not test the capital impact of the revised SA for securitization exposures in the trading book \*\*Source: BCBS 2016b

\*\*\* Correlation trading portfolio



#### Calibration results: questions, questions ...

- **Ü** Why is the relationship between revised SA and IMA capital charges discussed at the end of the FRTB but not at its start?!
- Ü How are ratios for revised SA and IMA explained?
  - ü Revised SA should be more conservative than revised IMA
  - ü Economic incentives to using revised IMA should be preserved
- **Ü** Which of the two approaches should be considered a credible benchmark?
- Ü How does calibration affect sensitivity to risk and the overall accuracy of market risk capital charges?..



#### **Calibration results**

- Approx. **30%** increase in capital between current IMA and revised IMA
- **1.4** : 1 ratio between revised SA and revised IMA

#### ... and how this was achieved

- $\ddot{\mathbf{U}} \downarrow$  Liquidity horizons for some risk factors
- $\ddot{U}$   $\uparrow$  Multiplier (m<sub>c</sub>) for ES from 1.0 to 1.5 (!)
- $\ddot{U}$   $\downarrow$  Liquidity horizons for some risk factors within several risk classes



#### ... and how this was achieved

Liquidity horizon	Rescaling		Affected risk classes / buckets
	before	after	
1	10	10	
2	20	20	
3	60	↓ 40	Credit spreads: sovereigns (high-yield), corporates (investment-grade) FX: volatility trades etc.
4	120	↓ <b>60</b>	Credit spreads: corporates (high-yield) Equities: volatility trades etc. Equities subject to DRC in revised IMA
5	250	↓ <b>60</b>	Credit spreads: volatility and other trades
5	250	↓ 120	Default risk in revised IMA: equities



#### Edgar Allan Poe, "Philosophy of Composition" (1846)

		YES	NO
1.	Extent (length): 92 pages (< 100)!	ü	
2.	Impression (effect): <i>universally accepte</i> contemplation of the beautiful, intense and pure elevation of soul	able (?)	ü
3.	Tone: sadness, melancholy (e.g. death of a beautiful woman!)	üü	
4.	Sense of identity: repetition, refrain	?	
5.	Originality: no impulse or intuition: red	calibration	üü
6.	Totality, or unity of effect		?
7.	Some amount of complexity, or adapta	ation üü	
8.	Some amount of suggestiveness – some undercurrent, however indefinit of meaning	e, ü	





As a conclusion: Is FRTB ...

a piece of art?	No, but not a fruit of science either!
economically attractive?	No, new market risk capital charges are even higher than the present ones based on Basel 2.5 deemed excessive and prohibitive at the start of FRTB!
simple? comparable?	No, complexity weakens the disciplinary strength of the regulation and undermines regulatory oversight!
consistent?	No, risk-sensitivity, consistency and accuracy are often sacrificed to industry interests, economic incentives and "common-sense" reasons

And yet, "politics is the ART of the possible", and regulation is a kind of politics!

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# **QUESTIONS???**