BUILT-IN MECHANISMS OF THE AMA FRAMEWORK THAT LED TO ITS CANCELLATION

About me



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Risk Management & Modeling Experience

Alior Bank (Poland)

- Worked in The Validation Unit - 8 years of experience
- Model Risk Manager, Model Risk Expert
- Areas: ECL/IFRS9, Operational Risk (AMA), Economic Capital Models, ICAAP
- Conducted 5 extensive AMA model validation processes
- Developed holistic AMA validation methodology

BSB (IT Company, Poland)

- Development of AMA modeling module in RiskOperon IT System
- Consultancy for banks (including Central Bank of Poland)

Accenture

- Projects in financial sector in Europe

AMA framework withdrawal

AMA withdrawal

CRR III: AMA withdrawal on 1st January 2025

Key regulatory concerns

- **Excessive variability** in risk-weighted assets (RWA)
- **Loss of confidence** in banks' reported risk -weighted capital ratios
- **Lack of comparability** of capital ratios between entities with similar risk profiles

[BIS, BCBS 2017]

Introduction

Para. 2

*„...At the peak of the global financial crises, a wide range of stakeholders– including academics, analysts and market participants – **lost faith in banks' reported risk -weighted capital ratios**. The Committee's own empirical analyses highlighted a **worrying degree of variability** in the calculation of RWAs by banks."*

Para. 3

*„Banks' reported **risk-weighted capital ratios should be sufficiently transparent and comparable** to permit stakeholders to assess their risk profile. The Committee's strategic review of the regulatory framework highlighted a number of fault lines with the existing architecture, particularly the extent to which it adequately balances simplicity, comparability and risk sensitivity.*

New direction

New regulatory proposal

The regulatory framework revisions, carried out under the Basel III project, were intended to **help restore credibility in RWA calculations**, particularly through:

1. **limiting the use of internal model-based approaches**;
2. **enhancing the robustness and risk sensitivity** of **standardised approaches** for credit and operational risk, which was meant to **facilitate the comparability of banks' capital ratios**; and
3. complementing the risk-weighted capital ratio with a finalised leverage ratio and a revised and robust capital floor

New direction

- **Abandonment (as in the case of operational risk)** or limitation (other risks) of the **applicability of internal statistical models,**
- while **slightly strengthening** (making more risk-sensitive) **simple, standardised methods** that do not require statistical calculation.

Implications

- **Long-term pause in the advancement of quantitative methods in banking**
- **Other areas were not „penalized”: Credit Risk – IRB Method, Market Risk**

AMA Framework – Basel II (2004)

Why Operational Risk in RWA concept?

- Spectacular high severity events in banking sector

What are we protecting against?

- High severity events
- Possible bank collapse
- Adequate level of protection: level of high severity and rare events (99.9% quantile)

Idea

- Building Operational Risk profile in bank
- Finding adequate level of protection based on that profile

AMA framework - how?

INPUT: 4 data elements

- → Internal data
- → External data
- → Scenario data
- → BEiCF

ADEQUATE DATA

- → Data integration mechanism
- → Scaling mechanism

HEAVY-TAILED DISTRIBUTION

- → Extreme value distributions
- → EVT, lognormal, GPD, GEV

DEPENDENCE MODEL

- → Multivariate distribution
- → Copula function

HOMOGENEITY: Segmentation

- → 7 risk categories
- → 8 business lines

ACTUARIAL CONCEPT: Separate models

- → Severity
- → Frequency

BODY & TAIL SEPARATION

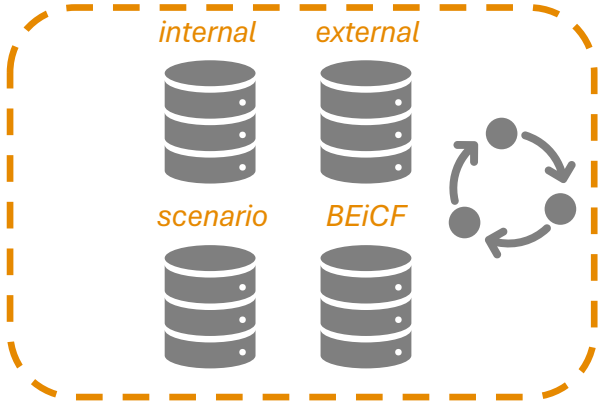
- → Distribution of body loss
- → Distribution of tail loss

DISTRIBUTION CONVOLUTION

- → Concept of aggregated distribution
- → Convolution of severity and Frequency
- → VaR

AMA model framework

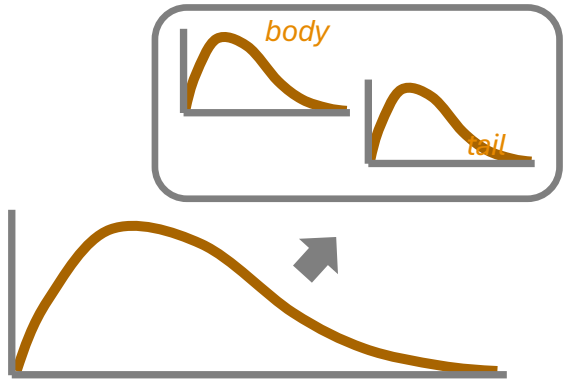
4 DATA ELEMENTS



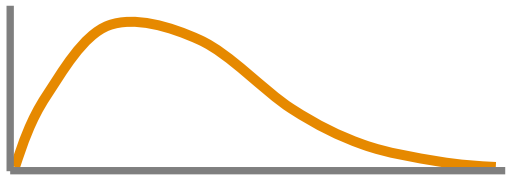
- Data integration
- Data scaling
- Segmentation
- Homogeneity

DISTRIBUTIONS

Severity

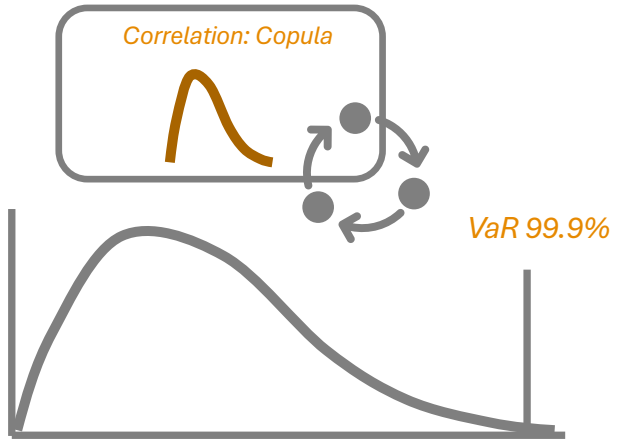


Frequency



Modeling process:
- Distribution decision
- Estimation
- Statistical verification
- Overall logic

AGGREGATED DISTRIBUTION



AMA framework – problematic assumptions

Problematic assumptions: Level of conservatism

Adequate level of protection

- **What is the unexpected situation that we should protect from?**
- **Adequate level of protection: 99.9%**
- **Definition of rarity**

Level 99.9% - interpretation

- Intuition: it's too conservative!!!
- Rooted in: definition of rarity: in time
- Integration with time horizon: one year
- once in 1000 years - **IT'S WRONG!!!**

Definition of rarity

- Rarity – it's relative
- Different meaning: rarity in time, rarity in relation
- Regulator: rarity in time

[BIS, BCBS 2011]

*„Whatever approach is used, a bank must demonstrate that its operational risk measure meets a soundness standard comparable to that of the internal ratings-based approach for credit risk (i.e. **comparable to a one year holding period and a 99.9th percentile confidence interval**).”*

[BIS, BCBS 2011]

*"Just in limited cases, for example when the biggest data point is demonstrated to be larger or equal in amount to the event that **occurs less than once in 1000 years**, the use of empirical curves to estimate the tail may be accepted in SBA models."*

Problematic assumptions: Definition of unexpected situation

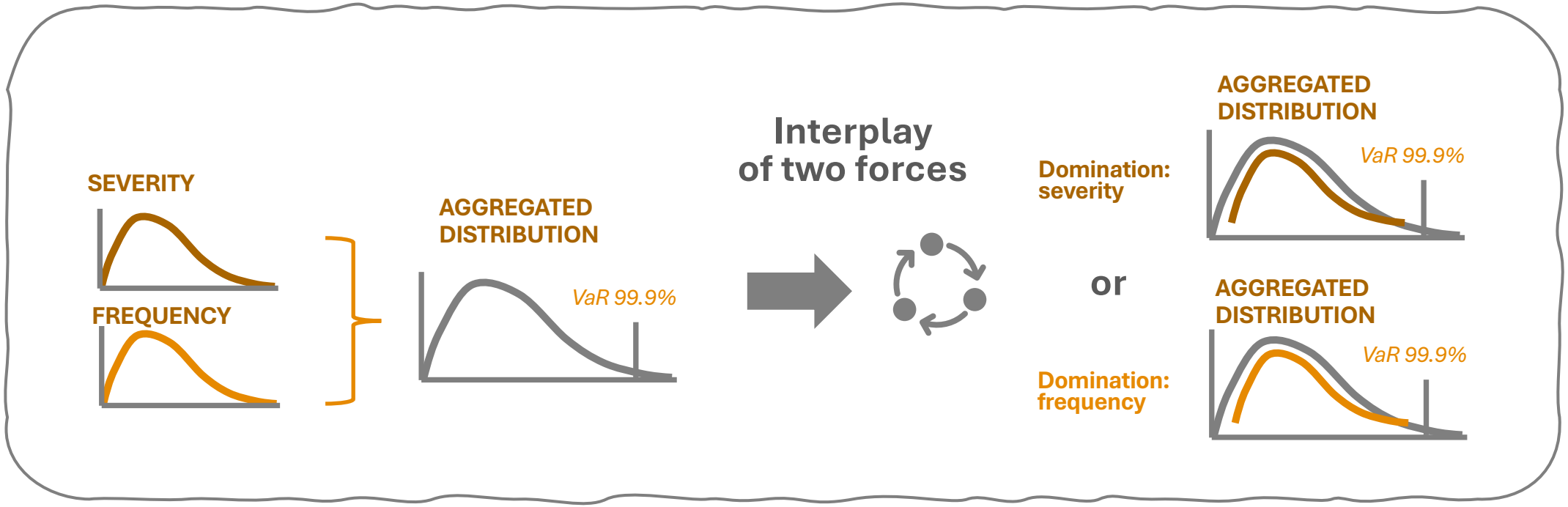
Basel II

- It's NOT defined
- We do not know how we should imagine this
- In Credit Risk (IRB) - it is defined

What we have

- Mechanism designed to generate an unexpected situation

INTERPLAY OF TWO FORCES CREATES UNEXPECTED SITUATION



Problematic assumptions: Severity distribution

Severity tail distribution

- Not allowed empirical distribution
- Pre-defined use of sub-exponential distribution in frequency
- Specific features of sub-exponential distributions
- Low dominating potential of frequency distribution
- Rule of interplay

[BIS, BCBS 2011]

„...in particular, when the data are medium/heavy tailed (therefore very dispersed in the tail), ***the use of empirical curves to estimate the tail region is an unacceptable practice*** *due to the inability to extrapolate information beyond the last observable data point."*

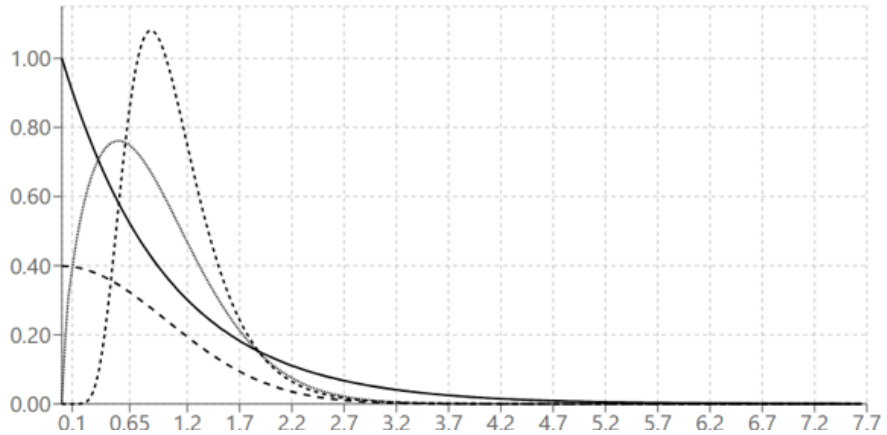
"The operational risk data from a severity perspective clearly illustrate ***positive skewness and medium-heavy tailedness (leptokurtosis).*** *In statistical terms, this may mean that not all the statistical moments of the severity distribution exist; in many cases the 2nd moment (ie the standard deviation) and higher moments, although always empirically calculable, are often enormous due to the relevant dispersion of the data."*

"A bank should pay particular attention to the ***positive skewness and, above all, leptokurtosis of the data when selecting a severity distribution****."*

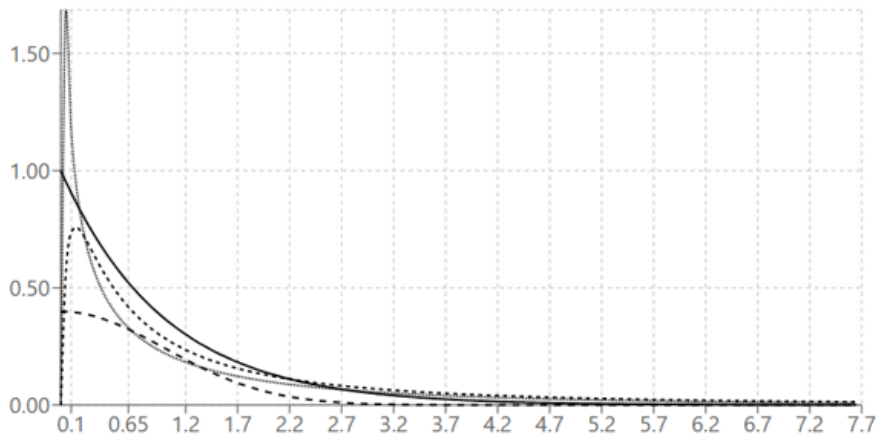
"In such cases the use of so-called ***sub-exponential distributions is highly recommended****. Subexponential distributions, which sometimes have a higher number of parameters than light tailed curves, can better represent the shape of the data in the tail (other than their skewness in the body) by allowing estimates of parameters that do not depend on the higher order statistical moments."*

Features of sub-exponential (heavy-tailed) distributions

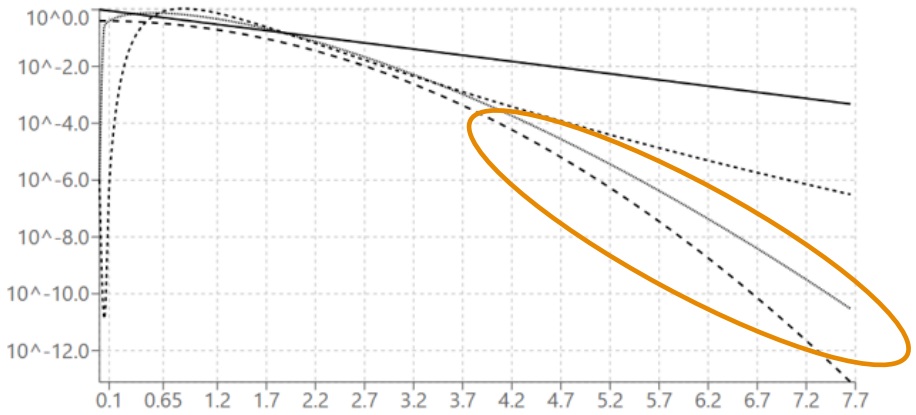
Light-tailed Weibull and lognormal distributions on a normal scale



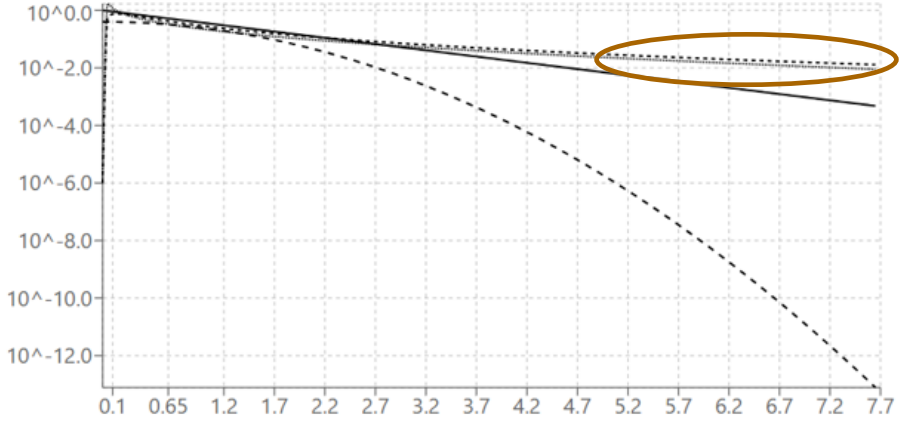
Heavy-tailed Weibull and lognormal distributions on a normal scale



Light-tailed Weibull and lognormal distributions on a logarithmic scale



Heavy-tailed Weibull and lognormal distributions on a logarithmic scale

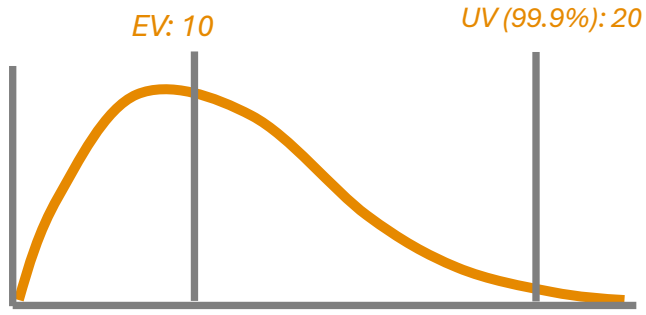


Sub-exponential (heavy-tailed) distributions

What it means?

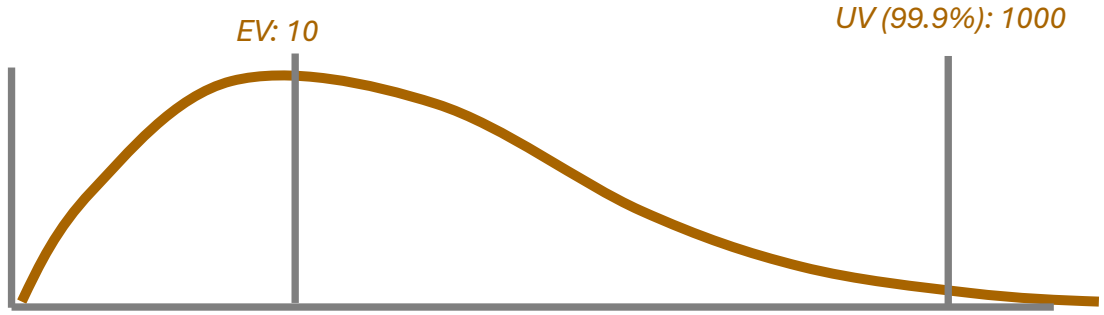
- **If something happens – it's huge**

Light-tailed distribution



- e.g. expected value is 10
- Then unexpected value is 20
- It's close

Heavy-tailed distribution



- e.g. expected value is 10
- **Then unexpected value is e.g. 1000!**
- It's far

Rationale:
Operational Risk specific. Lots of occurrences with low value and only few with extreme value. **That's how it is.**

Criticism of AMA framework

Criticism of the AMA regulatory method

Publications



„Backward step in the development of unexpected value modeling concepts in the financial sector: a case study of the decision to withdraw the ama framework in operational Risk”, Maciej Buczak, December 2025 ***preprint***



„Unexpected effects inherent in the AMA concept, determining its quality and ultimate withdrawal.”, Maciej Buczak, January 2025 ***preprint***

Abstract

The article presents a very detailed analysis of the AMA method, set within the framework of statistical and mathematical concepts. In this publication, I derive three properties that, in my opinion, went unnoticed during the method's 20 years of operation, which were built into this method, probably unintentionally. They were the result of the method's overcomplexity and ultimately, as I argue, the main reason for the loss of confidence in this method.

Criticism

I criticize the supervisor's approach, who shifted the burden of responsibility for AMA method's failures onto the banking sector and implementation methods. I, however, believe that the main burden of responsibility lies with the regulator, who implemented a poorly prepared concept, possessing unjustified overcomplexity that generated countless uncontrollable conceptual, statistical, and computational dispersions.

CRITICISM: Too broad in all aspects

Credit Risk

Rating models

- conceptual sub-optimality
- GINI, IV reach high levels
- New concepts: neural networks, machine learning

Expected Value

ECL construction:

- PD, LGD, EAD, FLI, SICR
- Various statistical concepts
- Relative conceptual freedom
- Results stability

Unexpected Value

IRB construction:

- Starting point: Expected value
- Defined unexpected situation
- Pre-defined normal distribution **?**
- Closed range of modelled value (0-100%)

Insurance sector

Unexpected Value

- Focused statistical model → unexpected value
- Well-grounded concepts
- standardized processes: licensed actuaries
- deep knowledge of phenomena
- high homogeneity of modelled classes
- availability of vast data sets

REASONABLE LIMITATIONS

- **One model → one phenomenon**
- **Limited dimension of complexity**
- **Focused on specific space**
- **Limited concepts / methods/sophistication**
- **Mature processes**
- **Simple data model**
- **Large datasets**

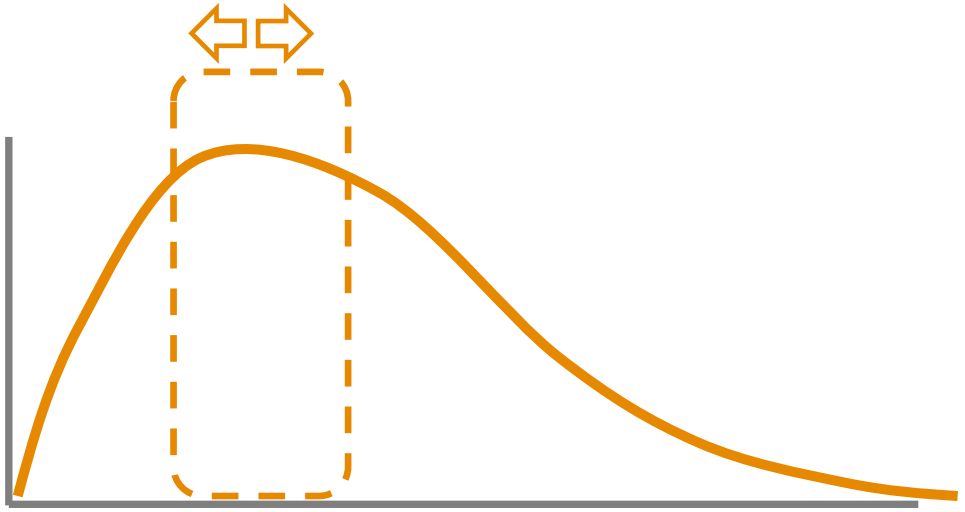
AMA MODEL

NO LIMITATION IN SCOPE
NO LIMTATION IN COMPLEXITY
NO LIMITATION IN DATA COMPLEXITY
NO LIMITATION IN SOPHISTICATION

!

Class of model: Expected and Unexpected value model

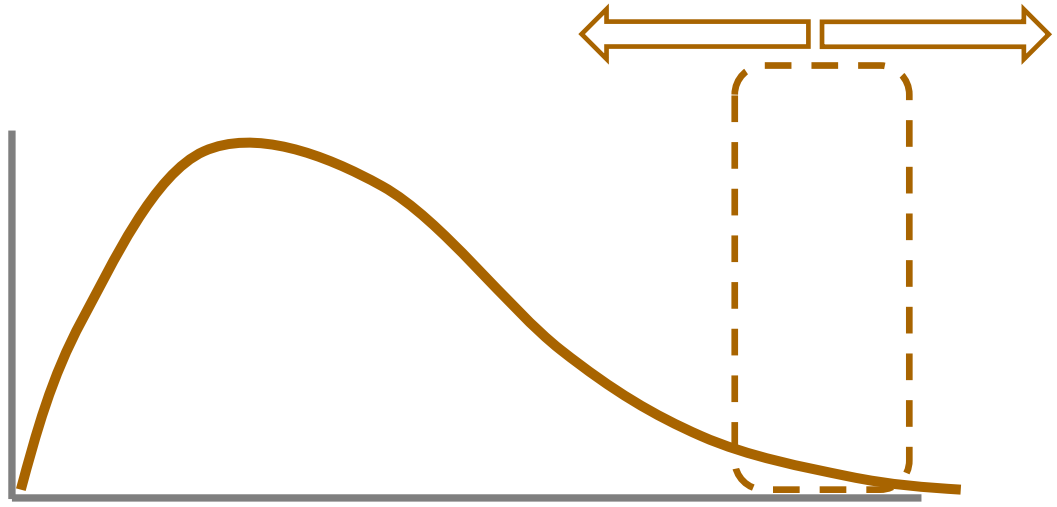
Modeling EXPECTED VALUE



MODEL CLASS SOPHISTICATION: **Low** | High

- Well-known, precise methods
- Sector maturity
- Portfolio effects, cross-reduction of dispersion
- Low sophistication
- Easy to backtest

Modeling UNEXPECTED VALUE



MODEL CLASS SOPHISTICATION: Low | **High**

- New methods, low precision, high dispersion
- Immaturity
- No portfolio effects, no methods for dispersion reduction
- High sophistication (EVT)
- Backtest – how?

CRITICISM: Phenomenon scope and data model complexity

SCOPE OF THE PHENOMENOM: Low **High**

OpRisk categories:
1. Internal fraud
2. External fraud
3. Employment Practices and Workplace Safety
4. Clients, Products, and Business Practices
5. Damage to Physical Assets
6. Business Disruption and System Failures
7. Execution, Delivery, and Process Management

All we can imagine :)

DATA MODEL COMPLEXITY: Low **High**

- 4 data elements:
  - Internal data
  - External data
  - Scenario data
  - BEiCF
- Data integration (4 data elements)

DATA ADEQUACY DIFFICULTY: Low **High**

- Maintaining data accuracy and timeliness
- Data accessibility
- Data reliability
- Data inadequacy to quantile 99.9%

CRITICISM: Conceptual and methodical scope of AMA

CONCEPTUAL SCOPE: Low | **High**

- → **Rarity concepts**
- → **Unexpected situation concept**
- → **Actuarial concepts: severity, frequency**
- → **KRI incorporation**
- → **BEiCF incorporation**
- → **Scenario analysis**
- → **Body/Tail concept**
- → **Heavy-tailed distribution**
- → **Extreme value Theory (I-st, II-nd)**
- → **Copula modeling concept**
- → **Model verification (backtest)**

STATISTICAL SCOPE: Low | **High**

- → Time series
- → Inductive statistics
- → Regression analysis
- → Scaling models
- → Modeling probability (truncated) distribution
- → Parameter estimation
- → Composition of probability distributions
- → Statistical model quality verification
- → Modeling dependence / multivariate distribution
- → Numerical/simulation methods
- → Conditional probability
- → Quantile calculation

APPROACH: Standard | **Non-standard**

SOPHISTICATION: Low | **High**

MODEL CLASS:

Expected Value | **Unexpected value** ✓

MODEL CLASS SOPHISTICATION: Low | **High**

CRITICISM: Dimension of complexity

Degree: I

Simple model with single variable

Degree: II

Simple model with multiple variables

Degree: III

Complex model with multiple variables

Degree: IV

Approach composed of complex models

Degree: V

Framework composed of approaches

- → **Increasing uncertainty**
- → **Increasing stochasticity**
- → **Increasing inconsistency between components**
- → **Increasing variability of results uncertainty**



AMA framework

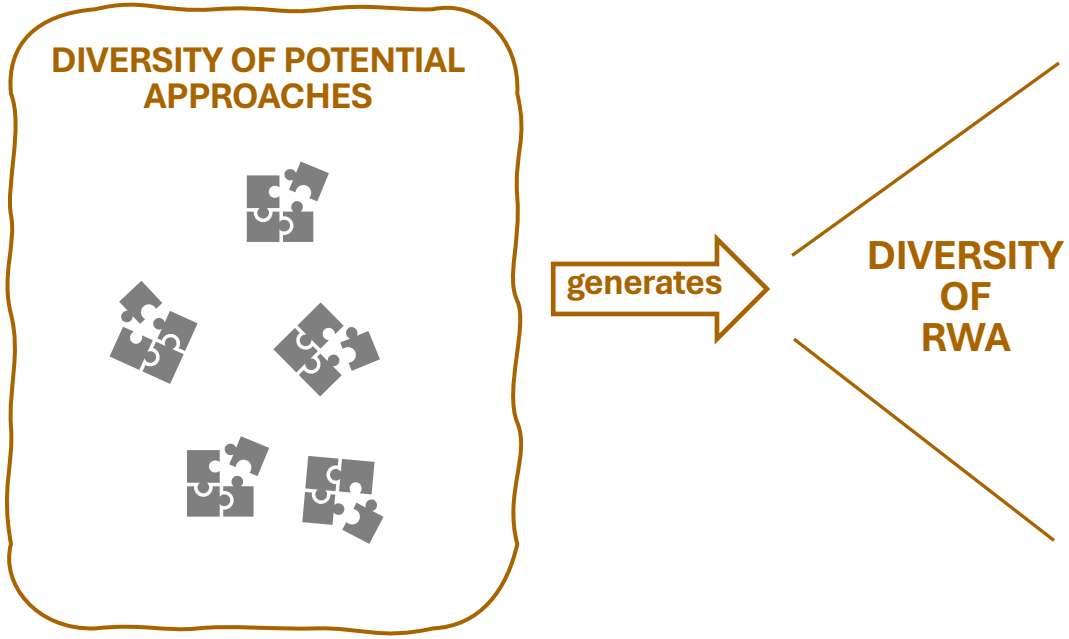
DIMENSION OF COMPLEXITY: Low → **Highest**

Regulatory Concern I: Excessive variability – MY RESPONSE

*The Committee's own empirical analyses highlighted a **worrying degree of variability** in the calculation of RWAs by banks."*

Commentary

- **YES. IT'S TRUE AND IT'S OBVIOUS**
- **Unfortunately, it couldn't have gone any other way**
- the AMA method was unjustifiably too complicated
- Approach – scope: ALL x methods: ALL
- while preserving substantial flexibility in model construction
- **excessive complexity leads to conceptual and computational divergence**

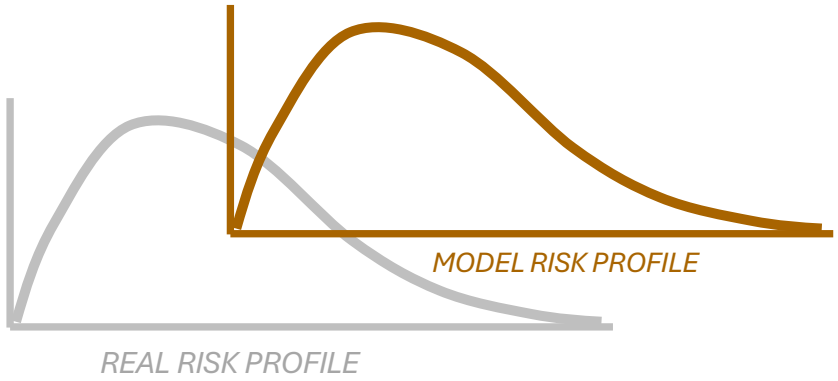


Regulatory Concern II: Loss of confidence – MY RESPONSE

„…At the peak of the global financial crises, a wide range of stakeholders– including academics, analysts and market participants – ***lost faith in banks' reported risk -weighted capital ratios****."*

Commentary

- **YES. IT'S TRUE**
- The regulator lost confidence in the alignment of AMA model results with the bank's profile
- **excessive complexity disconnects the model from reality / from the bank's risk profile**

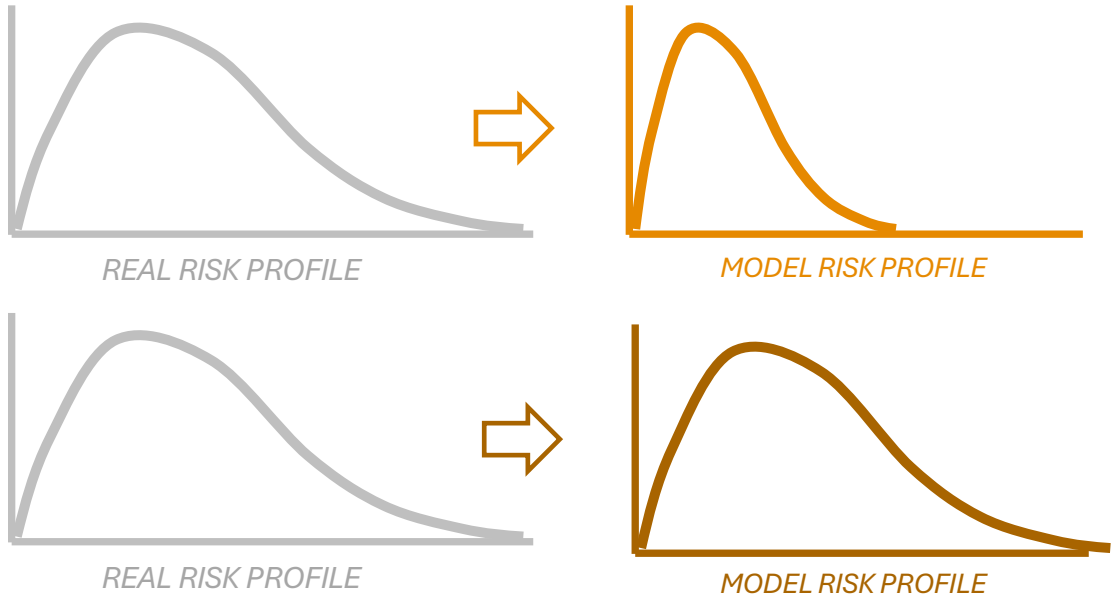


Regulatory Concern III: Loss of comparability – MY RESPONSE

*„Banks' reported **risk-weighted capital ratios should be sufficiently transparent and comparable** to permit stakeholders to assess their risk profile"*

Commentary

- **YES. IT'S TRUE**
- **Two banks with identical Risk profile could report different RWA**
- **excessive complexity creates variability, disconnects from the bank's risk profile → makes results incomparable**



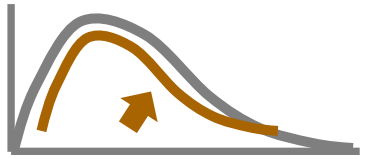
Built-in probabilistic effects identified on AMA framework

Specific effects identified during my work on publication:

„Unexpected effects inherent in the AMA concept, determining its quality and ultimate withdrawal.”,

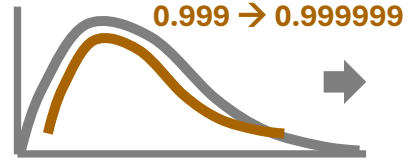
Effect I

Dominance of a single loss value at high quantiles of the aggregated loss distribution



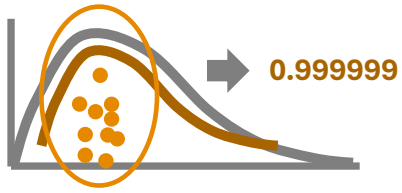
Effect II

Takeover of nonsensical quantile levels by the aggregated loss distribution



Effect III

Unjustified relationship between the frequency of small losses and the value of a single extreme loss



Why did it happen?

AMA framework: Expectations vs. Reality

EXPECTATIONS

Phenomenon

SCOPE OF THE PHENOMENOM:	Low	**High**

Data

DATA MODEL COMPLEXITY:	Low	**High**
DATA ADEQUACY DIFFICULTY:	Low	**High**

Concept & methods

CONCEPTUAL SCOPE:	Low	**High**
STATISTICAL SCOPE:	Low	**High**
APPROACH:	Standard	**Non-standard**
STATISTICAL SOPHISTICATION:	Low	**High**

Dimension of complexity

MODEL CLASS SOPHISTICATION:	Low	**Highest**



REALITY

PHENOMENOM MATURITY LEVEL:	**Low**	High
FRAMEWORK QUALITY:	**Low**	High
DEFINTIONAL PRECISIONS:	**Low**	High
DATA AVAILABILITY:	**Low**	High
DATA MODEL:	**Unrealistic**	Realistic
HOMOGENEITY:	**Low**	High
HIGH QUANTILE MODELING:	**Unrealistic**	Realistic
REQUIRED MODEL INTEGRATION:	**Unrealistic**	Realistic

Why did this fail?

Overall

The idea of super-concept

→ The illusion of a comprehensive description of risk phenomenon

Too broad in scope

→ To broad to control in statistical meaning

→ Lack of homogeneity

Overcomplexity of AMA framework

→ The construction got out of control and started generating numerous, difficult-to-manage effects

→ The construction became detached from reality, and thus from the phenomenon it was meant to model (operational risk), from its real shape and its characteristics.

Overestimated feasibility

Overvalued:

→ the current capabilities of the scientific world

→ the state of development of the discipline of operational risk research

→ the capabilities of the regulator and national supervisors in creating adequate standards,

→ the sector's ability to obtain reliable data for modeling this type of phenomenon,

→ and the sector's capacity to model such a complex phenomenon

Why did this fail?

More specific reasons

Having high-consequences definitional imprecisions

- → Definition of rarity (quantile 99.9%)
- → imprecision in heavy-tailed distribution
- → wrongly incorporated EVT concept
- → body-tail concept
- → dependence model

Generic (built-in) in AMA framework disadvantages

- → Random construction of unexpected situation
- → Uncontrolled effects of phenomenon dominance
- → Nonsensical relationships: e.g., number of events → quantile level of single-loss severity
- → Nonsensical quantile shifting (0.999 → 0.99999)

Unrealistic data model

- → 4 data elements
- → Impossible to integrate
- → Data accessibility

Lack of calibration tools

- → No tools to calibrate model
- → Impossibility to benchmark
- → No standards to follow

Lack of verification tools

- → No tools to verify model
- → Impossibility to backtest historically
- → Backtest of Expected value unreliable

Possible alternatives

GENERAL RULE

- Escape from idea of super-concept
- Reduction of conceptual dispersions
- Adaptation to the capabilities of the scientific community, regulators, and the banking sector

More focused alternatives

- Single loss distribution – focused on one phenomenon
- Limitation of range
- Limitation of complexity

More general alternatives

- Concentration on aggregated losses
- Reduction of complexity through generalization - Boltzmann model
- Escape from precision

Thank you ☺