ABN·AMRO

Practical Building Blocks of the AMA Model

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- ABN AMRO AMA Model
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- Capital Allocation

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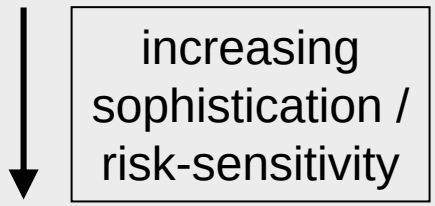
Introduction

Basel II Capital Accord

- **First Pillar – Minimum Capital Requirements**
- **Three measurement methodologies:**
  - The Basic Indicator Approach
  - The Standardised Approach
  - Advanced Measurement Approaches (AMA)



- **Use of AMA subject to qualifying criteria and supervisory approval**

Introduction

AMA Qualifying Criteria

- ✓ **An ORM Framework that is in place (including Governance; roles and responsibilities)**
- ✓ **A well documented management approach**
- ✓ **An approach that is part of day-to-day processes**
- ✓ **Regular reporting**
- ✓ **A well documented measurement system**
- ✓ **Regular audits**
- ✓ **External validation**

ABN AMRO Model and Data Criteria

Soundness Criteria for the Model

Aligned The Economic Capital model and the Regulatory Capital model must be aligned in terms of model, data and approach.

Consistent The same model (sources) must be applied to all units of the bank.

Verifiable The way the inputs of the model are treated in the model must be verifiable.

Robust The model must be able to accommodate changes (e.g. changes in the organisational structure or the risk classifications) with minimal loss of information.

Transparent Given a set of inputs, the model must behave in a predictable and obvious manner.

Acceptance criteria for the data

Objectivity Data that are more objective are strongly preferred over more subjective data.

Uniformity Only data that can be computed in all areas of the bank are used.

Periodicity Only data that can be computed at regular intervals are used.

Conformity: Only data that satisfy a consistent reporting standard will be used.

Simplicity From a practical point of view, we have also been careful to select only those data elements that can be collected at minimal additional cost.

Auditability The data inputs in the model must be auditable.

Introduction

AMA Key Elements

- **Internal Data**
  - Tracking of internal loss data considered essential prerequisite
  - Minimum five year observation period
  - Appropriate thresholds exist
- **External Data**
  - Use relevant external public / pooled industry data
  - Systematic process for determining situations for which to use external data
  - Well reasoned methodology to incorporate external data

Introduction

AMA Key Elements

- **Scenario Analysis**
  - Scenario analysis of expert opinion to evaluate exposure to high risk events
- **Business Environment & Internal Control Factors**
  - Capture meaningful driver of risk
  - Based on expert judgement
  - Translatable into quantitative measures

Contents

ABN AMRO AMA Model

Overview

- **Loss Distribution Approach (LDA)**
- **Value-at-Risk / Monte Carlo Simulation**
- **Top-down calculation**
  - Calculate capital at Group level and allocate to Business Units
- **Single methodology to determine both Economic Capital (EC) and Regulator Capital (RC)**

ABN AMRO AMA Model

AMA Key Elements – Internal Data

- **Corporate Loss Database**
- **Data fields:**
  - Gross loss, direct recoveries, indirect recoveries, net loss
  - Date of occurrence, data of recognition
  - Organizational unit, product
  - Event type, cause type
- **COO sign-off to ensure CoCoCo**
- **Used to model *frequency* distribution and allocation *risk-factor***

ABN AMRO AMA Model

AMA Key Elements – External Data

- **Operational Risk data eXchange (ORX)**
- **Data pooling consortium of 20+ leading banks, of which ABN AMRO is a founding member**
- **Members include:**
  - JP Morgan Chase & Co, Bank of America
  - ING, Fortis, Deutsche Bank, Commerz Bank
  - HBOS, Banca Intesa, Sao Paolo IMI, BBVA
- **Used to model *severity* distribution**

ABN AMRO AMA Model

AMA Key Elements – Scenario Analysis

- **Operational Risk data eXchange (ORX)**
- **Industry data contains loss events that could potentially occur at ABN AMRO**

ABN AMRO AMA Model

AMA Key Elements – BE&IC Factors

- **Group Audit *high-risk* findings**
- **Used to determine allocation *Business & Control Environment* (BCE) *factor***

Contents

Group Level Capital

Overview

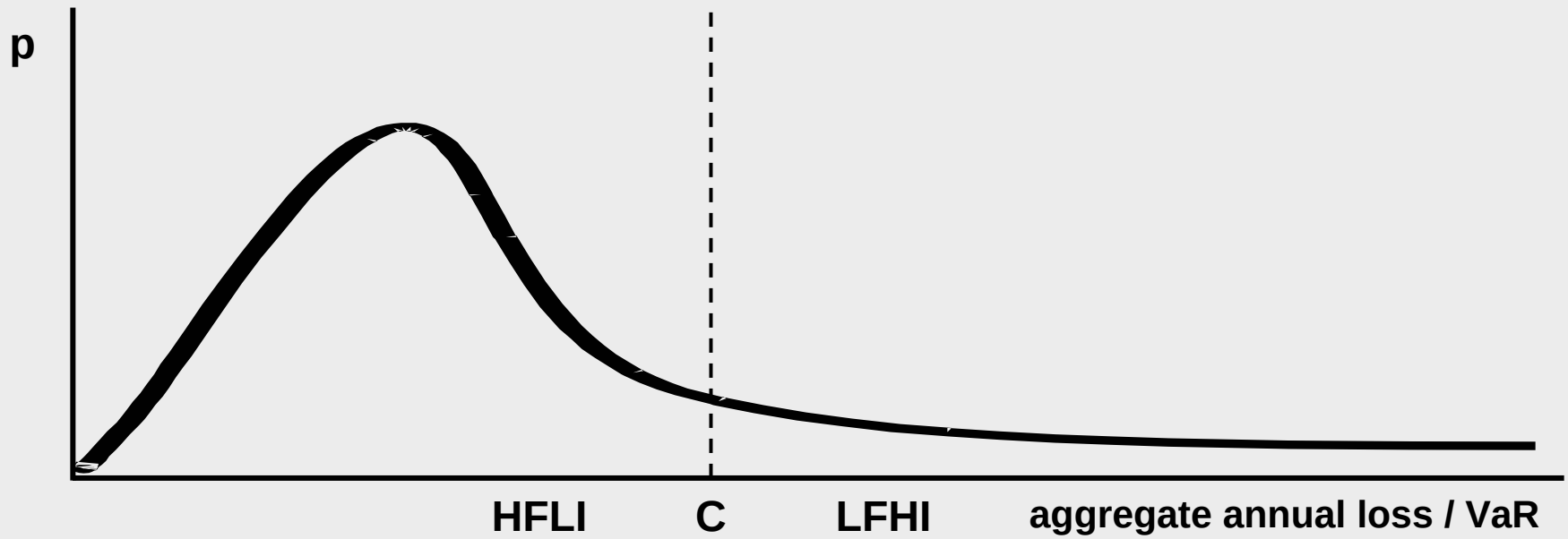
$$Risk = Likelihood \cdot Impact$$

- **Likelihood modeled using a *frequency* distribution of *internal* OpRisk events**
- **Impact modeled using a *severity* distribution of *external* OpRisk events**
- **Frequency and severity distribution convoluted using Monte Carlo Simulation**

Group Level Capital

Aggregate Annual Risk Distribution

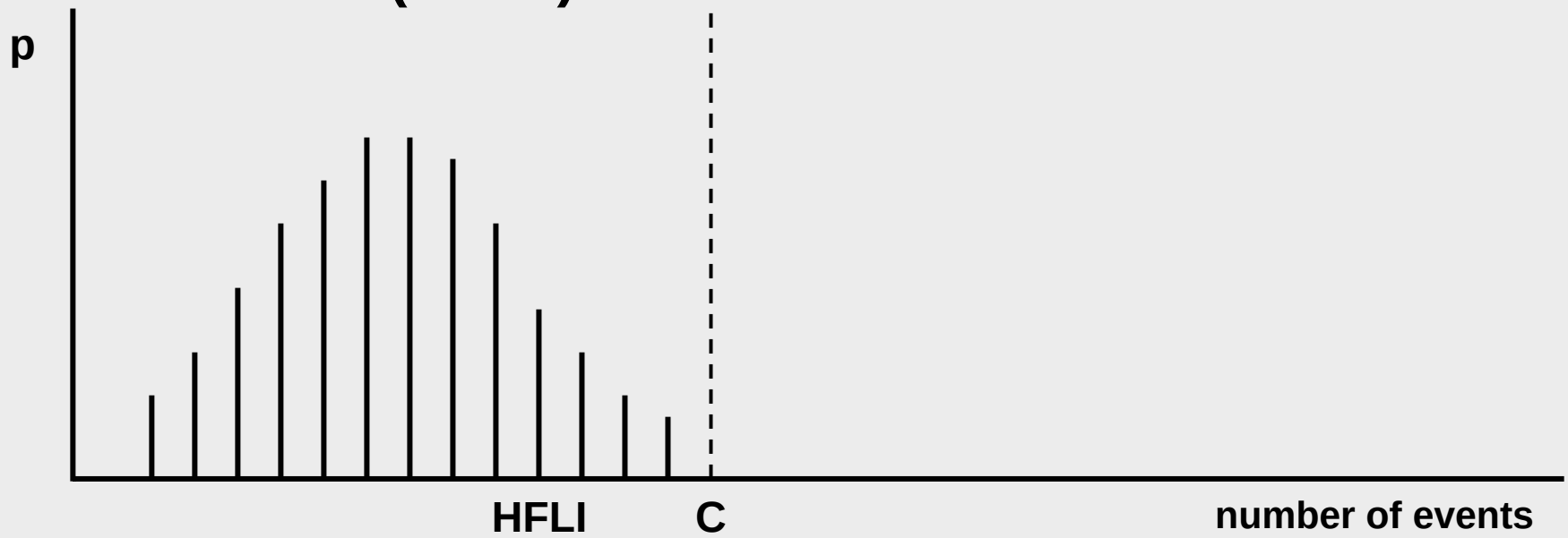
- **Difficult to model HFLI / LFHI events with single distribution**



Group Level Capital

Frequency Distribution

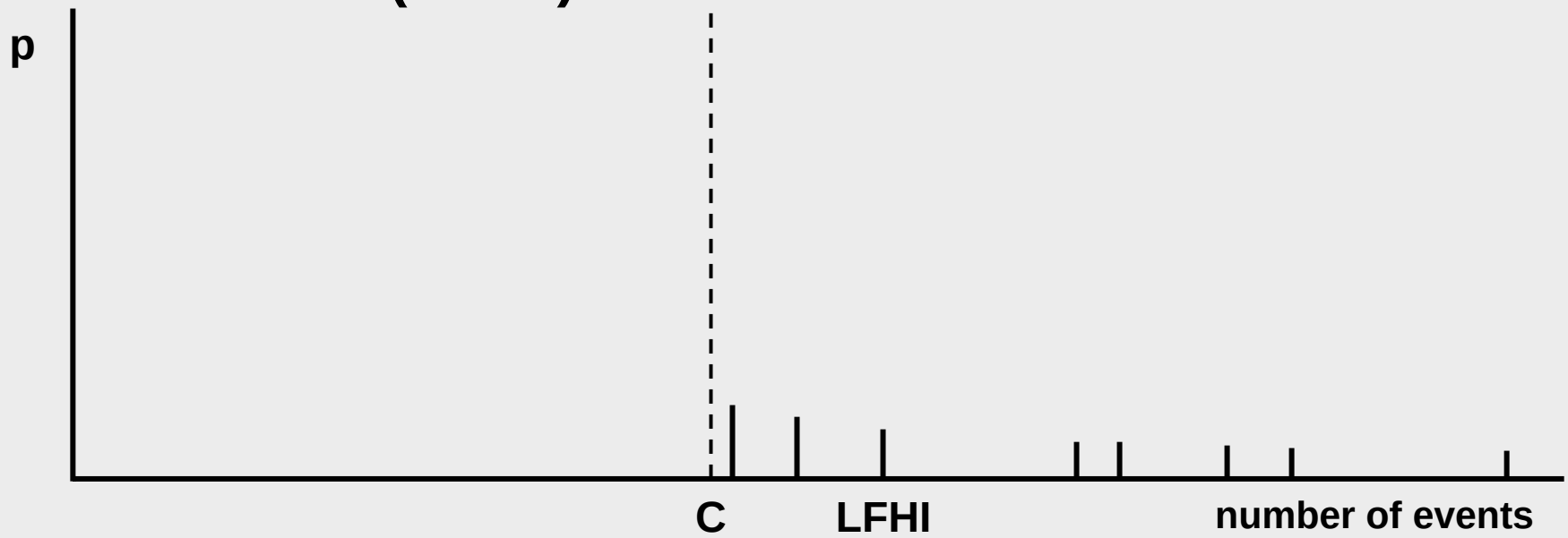
- **Poisson distribution used to model *frequency* of HFLI events**
- **Internal (CLDII) data**



Group Level Capital

Frequency Distribution

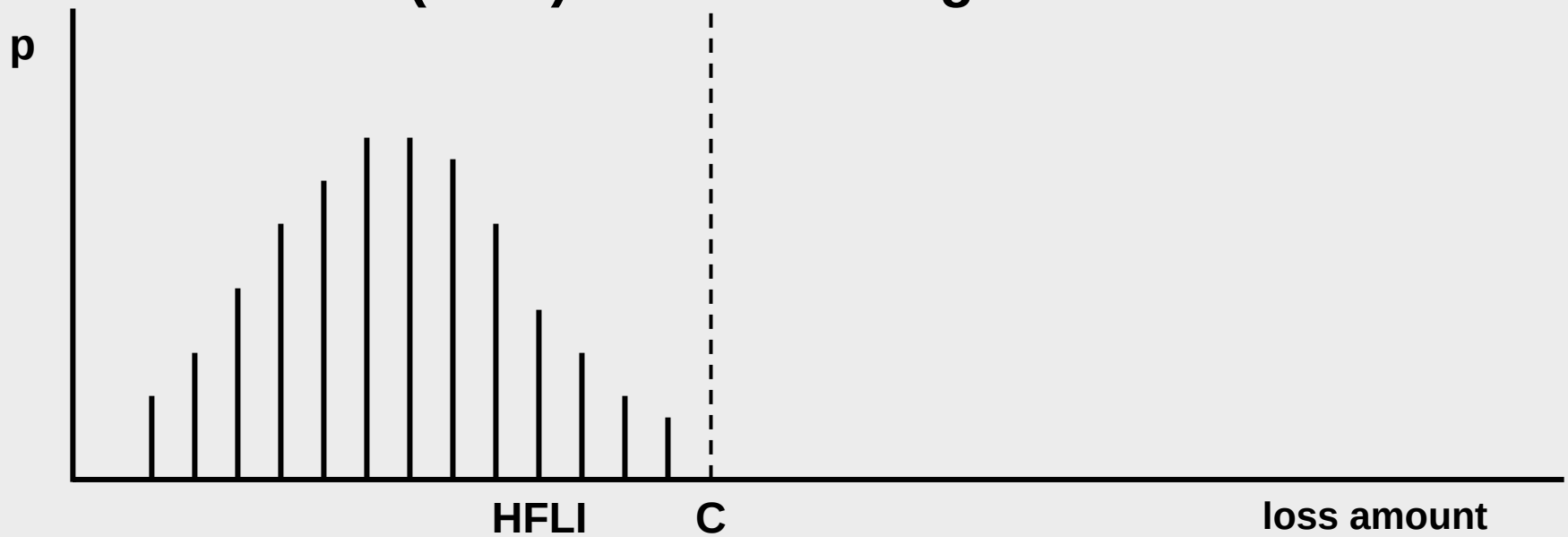
- **Poisson distribution used to model *frequency* of LFHI events**
- **Internal (CLDII) data**



Group Level Capital

Severity Distribution

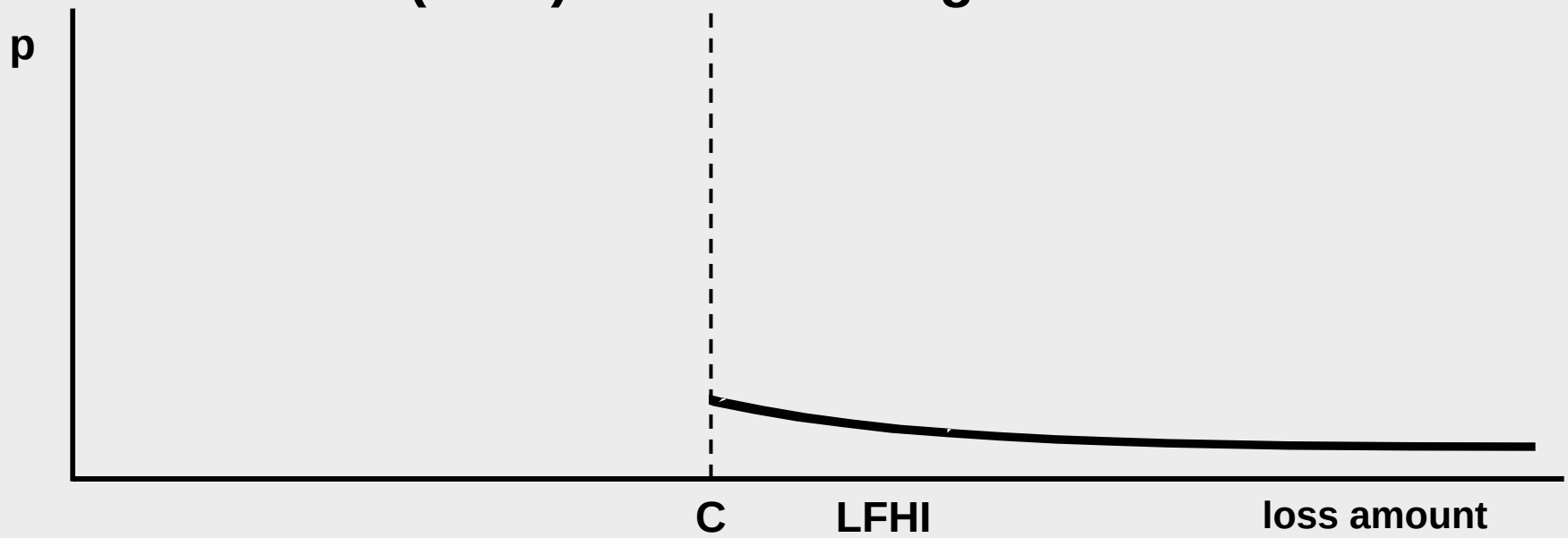
- **Empirical distribution (histogram) used to model *severity* associated with a single HFLI event**
- **External (ORX) data including ABN AMRO losses**



Group Level Capital

Severity Distribution

- **LogNormal distribution used to model *severity* associated with a single LFHI event**
- **External (ORX) data including ABN AMRO losses**



Group Level Capital

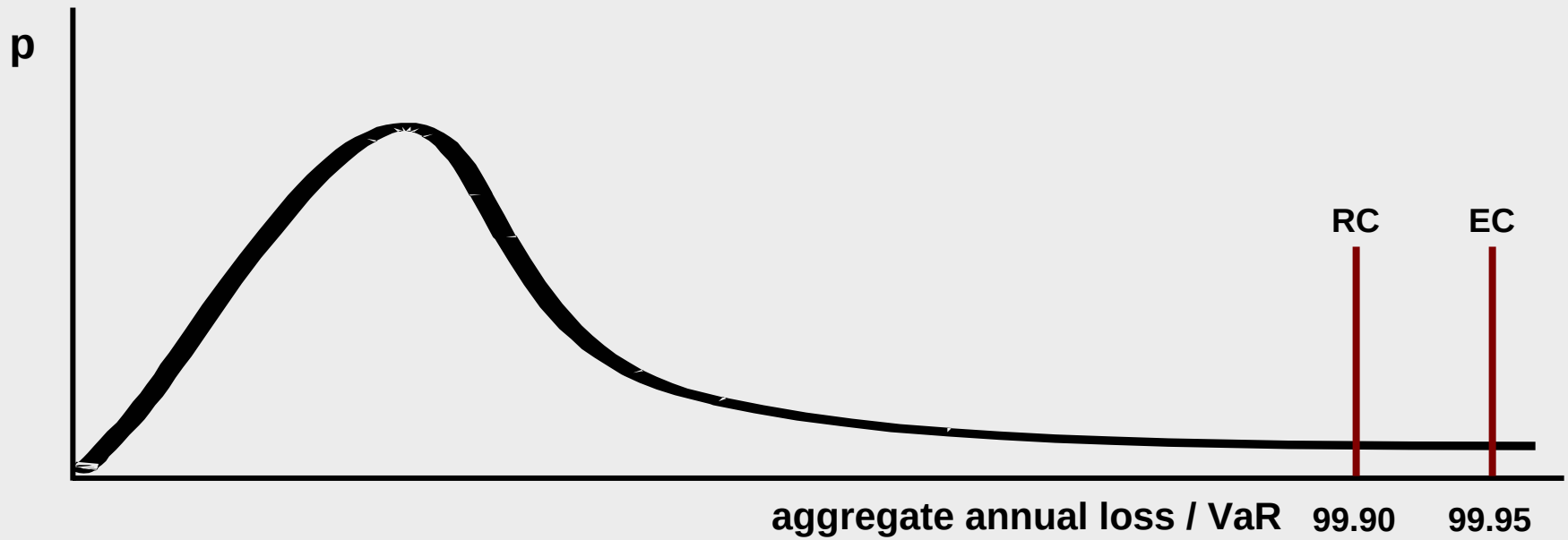
Monte Carlo Simulation

1. **Draw number *n* from HFLI Poisson distribution**
2. **Draw *n* losses from HFLI histogram**
3. **Draw number *m* from LFHI Poisson distribution**
4. **Draw *m* losses from LFHI LogNormal distribution**
5. **Add losses to obtain a single annual loss**
6. **Repeat steps 1 – 5 100,000 times**
7. **Bootstrap datasets**
8. **Repeat steps 1 – 7 100 times**

Group Level Capital

EC / RC

- **RC = VaR 99.90% confidence level**
- **EC = VaR 99.95% confidence level**



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Capital Allocation

Overview

- **Allocate Group level EC to each BU once per year**
- **‘Adjust’ BU level EC in remaining quarters**
- **Allocation based on three factors:**
  1. A business dependant *size-driver*
  2. A loss dependant *risk-factor*
  3. An OpRisk Management specific *BCE-factor*
- **Figures *aligned* with Standardised Approach**

Capital Allocation

Business size-driver

- **Revenue in eight quarter window**
- **Use of revenue in line with Basel II / DNB**

Capital Allocation

Business size-driver Example

2005			
Q1	Q2	Q3	Q4
375	370	350	405

$$BU_{RETAIL,REVENUE} = 375 + 370 + 350 + 405 = 1{,}500$$

Capital Allocation

Risk-factor

- **Sum of OpRisk losses in eight quarter window**
- **Compared to *Group***

$$BU_{RISKFACTOR} = \frac{SumOfCLDLosses(BU)}{BU_{REVENUE}}$$

$$BU_{RISK\%} = \left(\frac{BU_{RISKFACTOR}}{Group_{RISKFACTOR}} - 1 \right) \cdot \alpha$$

$$\alpha = 10\%$$

Capital Allocation

Risk-factor Example

2005			
Q1	Q2	Q3	Q4
1,200,000	800,000	700,000	1,800,000

$$BU_{RETAIL,RISKFACTOR} = \frac{1{,}200{,}000 + 800{,}000 + 700{,}000 + 1{,}800{,}000}{1{,}500} = 3{,}000$$

$$Group_{RISKFACTOR} = 6{,}400$$

$$BU_{RETAIL,RISK\%} = \left(\frac{3{,}000}{6{,}400} - 1\right) \cdot 10\% = -5.31\%$$

Capital Allocation

BCE-factor

- **High-risk audit findings in eight quarter window**
- **Compared to *Group***

$$BU_{BCEFACTOR} = \frac{AuditRatings(BU)}{BU_{REVENUE}}$$

$$BU_{BCE\%} = \left(\frac{BU_{BCEFACTOR}}{Group_{BCEFACTOR}} - 1 \right) \cdot \beta$$

$$\beta = 5\%$$

Capital Allocation

BCE-factor Example

2005																
Q1				Q2				Q3				Q4				
1	2	4	q	1	2	4	q	1	2	4	q	1	2	4	q	
2	4	6	4.9	1	1	6	3.9	3	1	6	4.1	1	2	5	2.1	

$$BU_{RETAIL,BCEFACTOR} = \frac{4.9 + 3.9 + 4.1 + 2.1}{1{,}500} = 0.01$$

$$Group_{BCEFACTOR} = 0.017$$

$$BU_{RETAIL,BCE\%} = \left(\frac{0.01}{0.017} - 1 \right) \cdot 5\% = -2.06\%$$

Capital Allocation

Allocation Key

- **Key determined from *size-driver*, *risk-factor* and *BCE-factor***

$$BU_{KEY} = BU_{REVENUE} \cdot \left(1 + BU_{RISK\%} + BU_{BCE\%}\right)$$

Capital Allocation

Allocation Example

$$BU_{RETAIL,KEY} = 1{,}500 \cdot (1 - 5.31\% - 2.06\%) = 1{,}389$$

$$BU_{WHOLESALE,KEY} = 3{,}500 \cdot (1 + 3.79\% + 4.83\%) = 3{,}802$$

$$= 5{,}191$$

$$EC_{GROUP} = 1{,}127$$

$$EC_{RETAIL} = \frac{1{,}389}{5{,}191} \cdot 1{,}127 = 302$$

Capital Allocation

Quarterly Adjustment

- **Provide stable figures**
- **Based on trend in allocation keys**

$$EC_{NEW} = \frac{BU_{KEY,NEW}}{BU_{KEY,INITIAL}} \cdot EC_{INITIAL}$$

$$BU_{KEY,NEW} = BU_{REVENUE,NEW} \cdot \left(1 + BU_{RISK\%,NEW} + BU_{BCE\%,NEW}\right)$$

Capital Allocation

Quarterly Adjustment Example

$$BU_{RETAIL,KEY,NEW} = 1{,}416$$

$$EC_{RETAIL,NEW} = \frac{1{,}416}{1{,}389} \cdot 302 = 308$$

Questions

Questions