

# Capital Allocation for Operational Risk

## Implementation Challenges for Bank Supervisors

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# Goals of Bank Supervisors

- Allocate capital according to a risk-focused approach to the quantification of operational risk
- Provide incentives for banks to measure and manage operational risks
  - Promote sound internal policies / controls / procedures
  - Motivate investment in operational risk infrastructure to reduce operational risk
- Ensure appropriate consideration of stress testing / systemic risk
  - Consideration of systemic implications of operational risk decisions made by individual firms

# Role for OpRisk Quantification

- Enables measurement of capital based on historical experience of firm
  - Most accurate measure of idiosyncratic risk of individual firms
  - Rewards firms that can reduce operational risk
- Improves bank decision making
  - Provides framework for explicitly measuring gains from reducing risk
- Provides a mechanism for better understanding “tail events,” those that may be outside a bank’s historical experience
- Provides method for measuring the effect of risk mitigation tools

# FRB Boston Operational Loss Data Initiative

- Several institutions, of varying size and product mixes, provided us with operational loss data
- Data is considered strictly confidential
  - Bank-specific information is used solely for supervisory purposes
- We have detailed discussions with banks regarding data collection issues and quantification methods
- General observations about quantification methods:
  - AMA methods are within the reach of most large institutions
    - main cost is data collection
    - with data, loss distributions can be calculated relatively easily

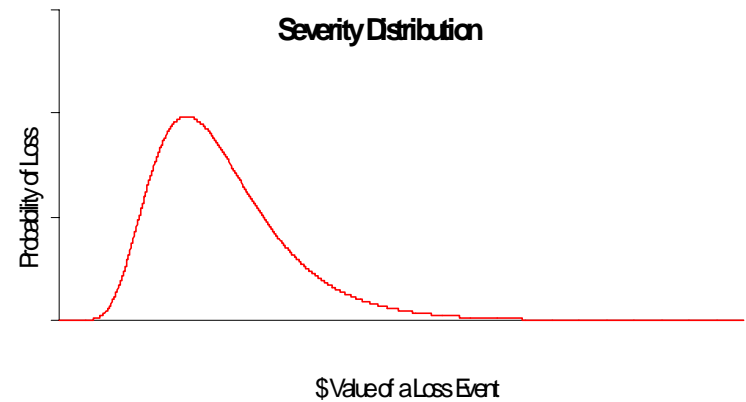
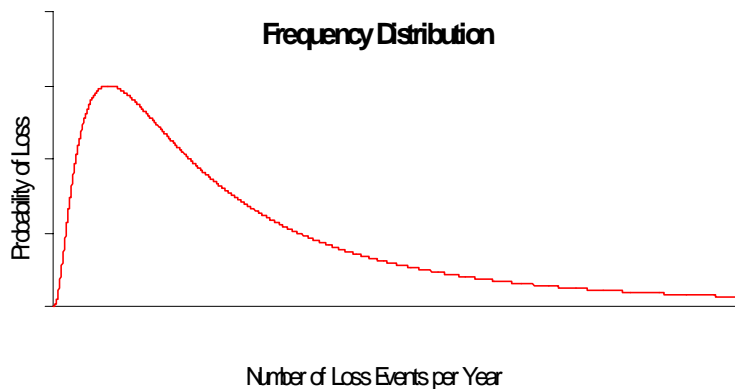
# Data Discussion

- To maintain the confidentiality of bank-specific data, all empirical examples provided in this presentation are based on a “constructed” database, *not* actual bank-level data. The database was constructed in a manner so that it would be impossible to uncover bank-specific information, but still provide empirical results that mirror our general findings from actual data.
- The constructed database:
  - omitted several banks that supplied us with data
  - combined business lines from several banks
  - contains no bank in its entirety
  - transformed data that was used
- Thus, the axes on each of the graphs in this presentation are *not* relevant and *not* reflective of any bank.

# Overview of Quantification Techniques

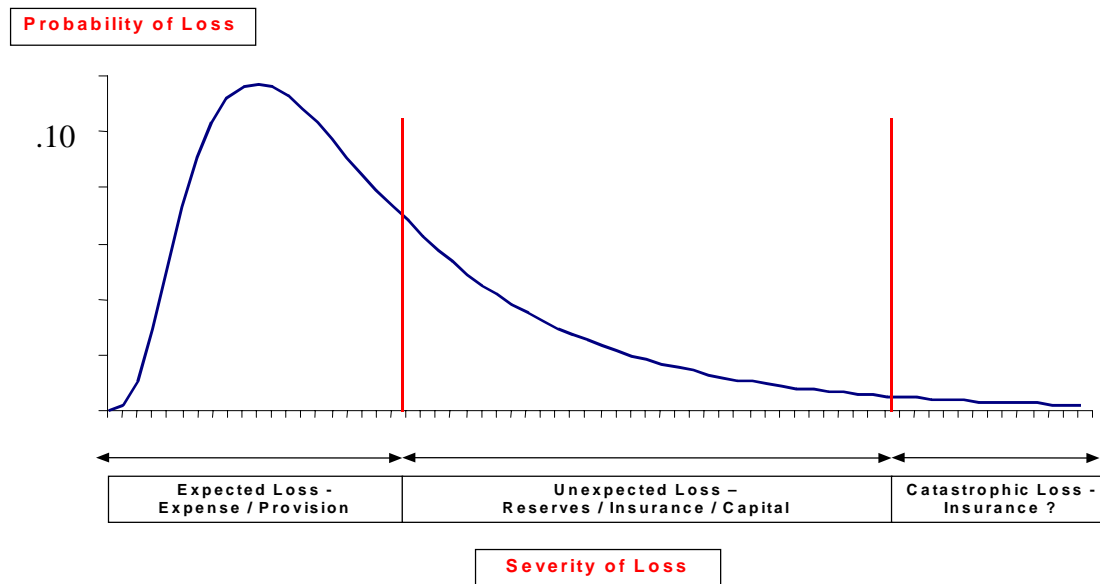
Generally, the estimation of operational loss distribution involve 3 steps:

1. Estimating a frequency distribution
2. Estimating a severity distribution
3. Running a statistical simulation to produce a loss distribution



# Overview of Quantification Techniques

- The estimated operational loss distribution would take the form of something similar to:



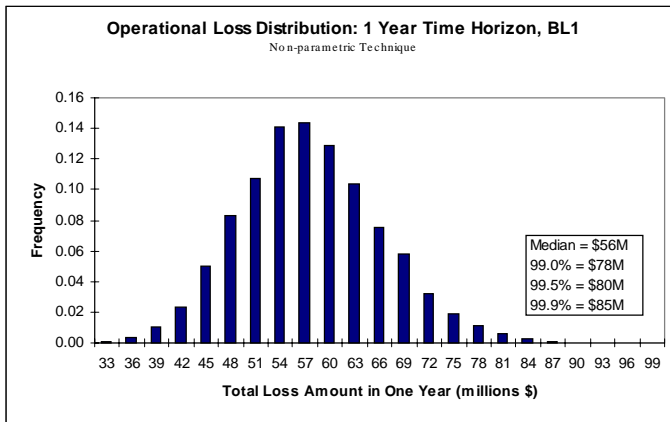
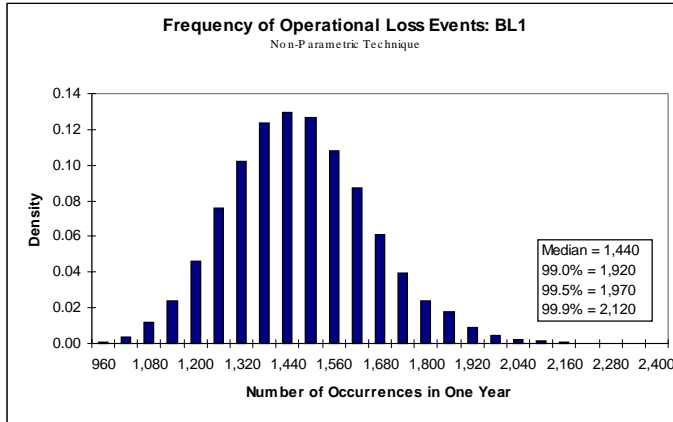
# Quantification: Distributional Assumptions

- Selection of distributional assumptions are important
  - Parametric vs. Non-Parametric
  - Appropriate distributional assumption likely differs
    - by business lines
    - by institution
- Supervisors must be concerned about incentives banks have to choose a specific methodology

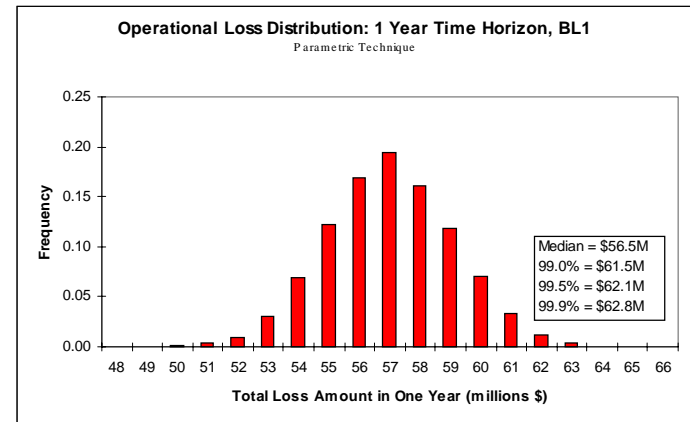
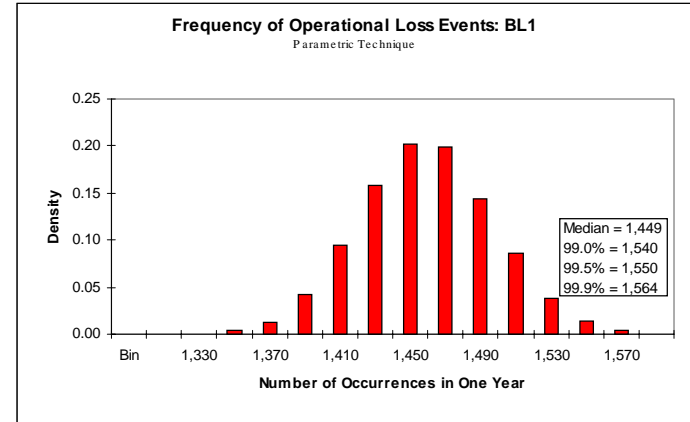


# Distributional Assumptions Matter

## Non-Parametric



## Parametric

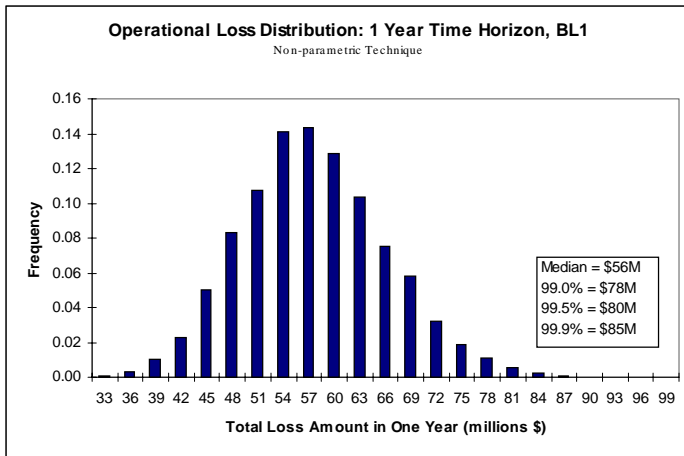
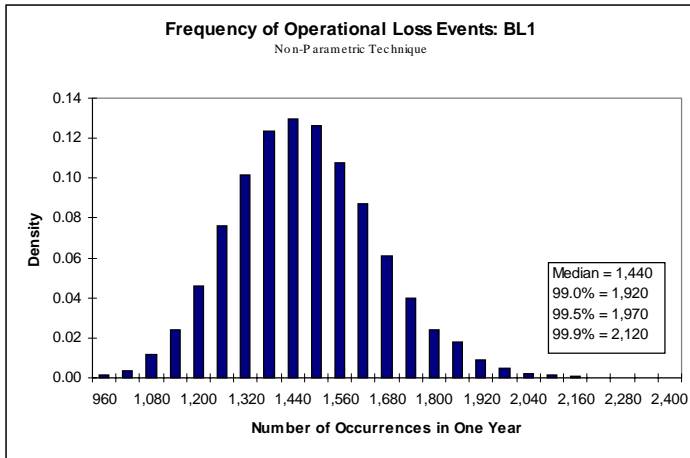


# Quantification: Scaling of Data

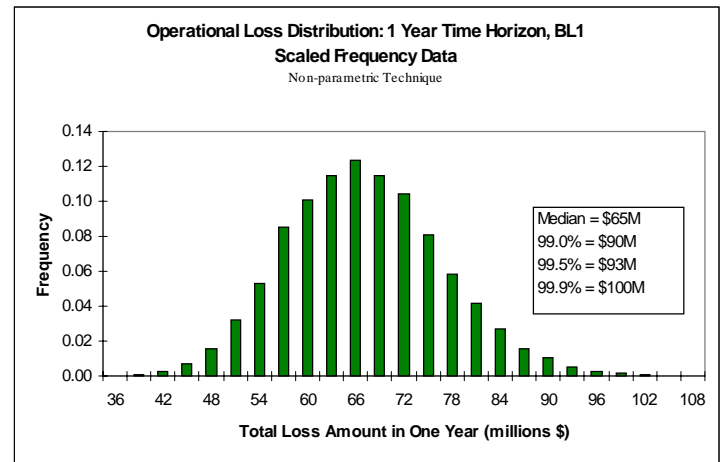
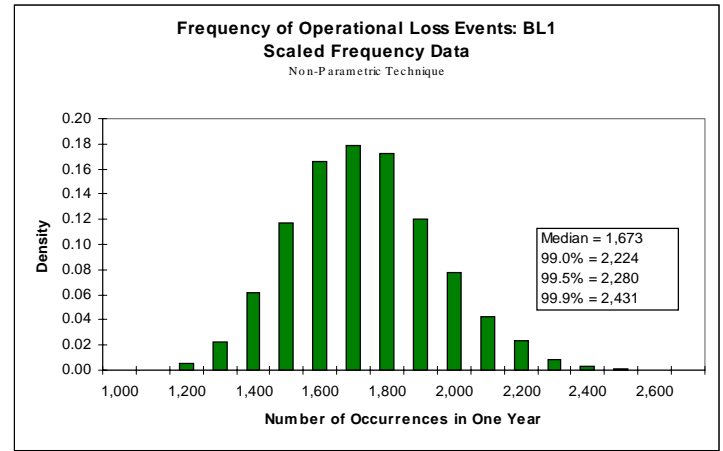
- Why scale data?
  - Level and mix of business activity changed so that historic data are not reflective of current loss rates
    - impact on frequency distribution - more/less frequent events
    - impact on severity distribution - exposure increases/decreases
  - Thus, blindly using historical operational loss data can be misleading
- Conceptually, scaling is straightforward
- In practice, implementing is quite difficult
  - What variable / methodology should be used to scale?
  - The return of the exposure indicator?

# Scaling Matters

## Non-Parametric, No Scaling of Data

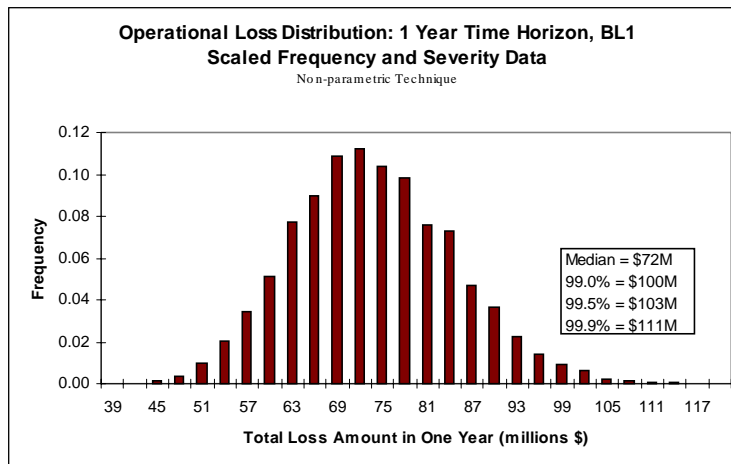
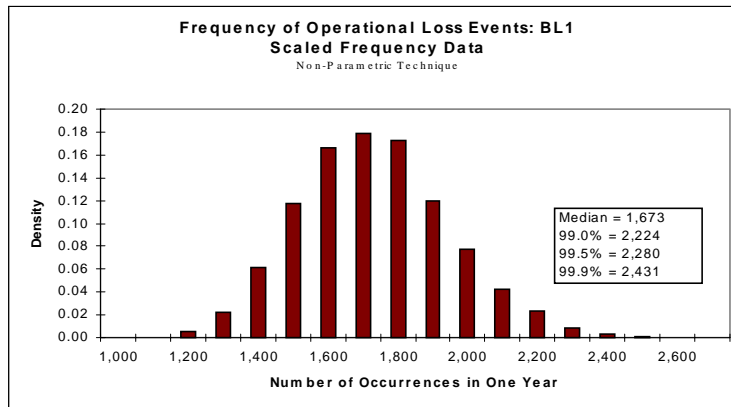


## Non-Parametric, Scaling of Frequency Data



# Scaling Matters

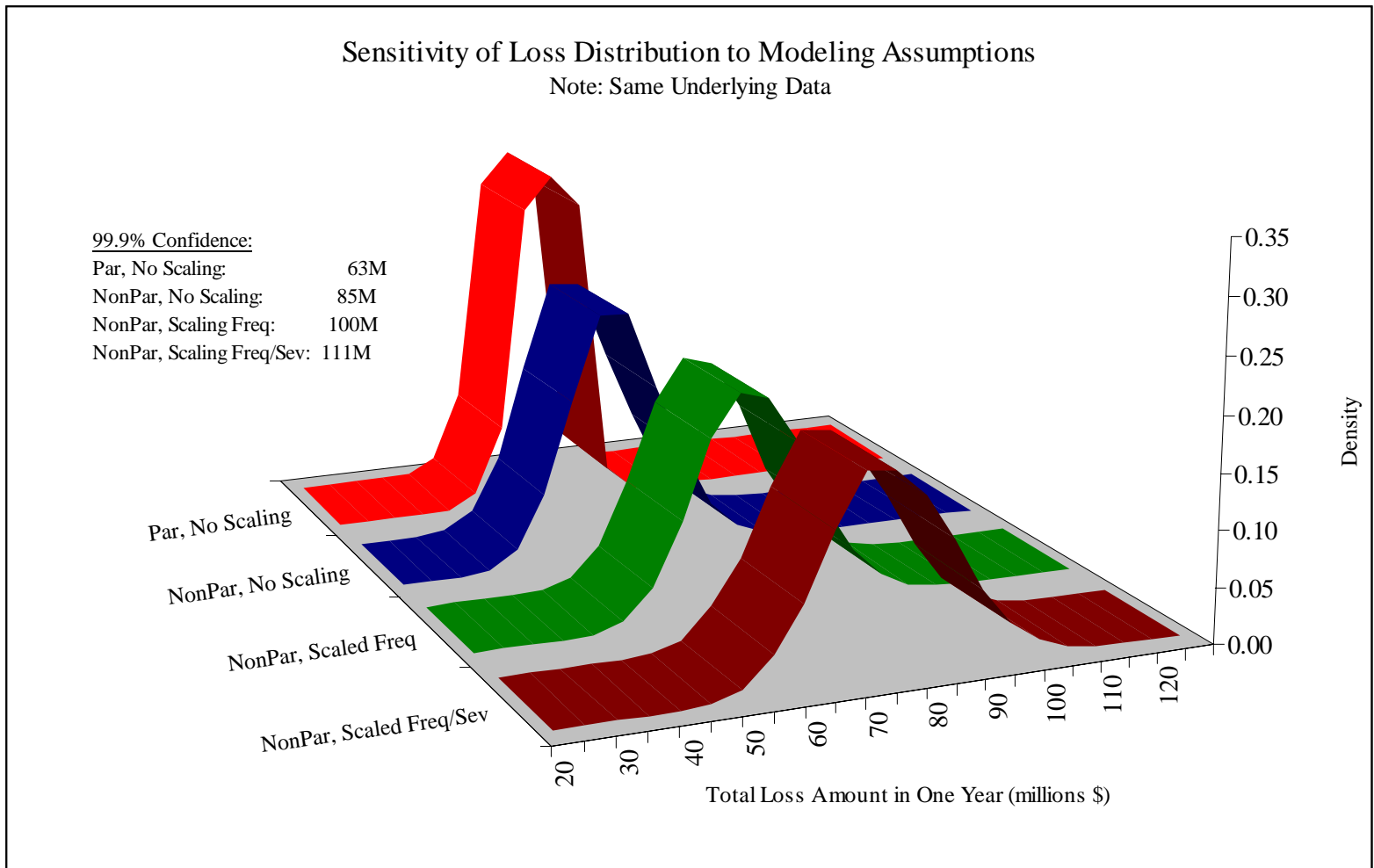
## Non-Parametric, Scaling of Frequency and Severity Data



## Impact of Scaling

- Required capital at the 99.9% confidence level, no scaling of data: = **85M**
- If scale frequency data: = **100M** (18% increase)
- If scale both frequency and severity data: = **111M** (30% increase)

# Implementation Details are Important



# Quantification: How to Handle “Tail Events”

- How does a bank with *no* experience with high-severity events incorporate the possibility that such an event could occur at their institution?
  - External data?
  - Scenario analysis?
- How does a bank that experienced a high-severity event deal with that event in their quantification analysis?
  - Loss distributions are sensitive to the inclusion of extreme events
  - How long should the bank retain the extreme event in their database?
  - If problem is corrected / controls enhanced, should event remain in database?

# Quantification: Risk Mitigation Techniques

- Insurance: outstanding issues regarding conversion of operational risk to credit / legal risk
- Insurance as capital offset:
  - Using information about deductibles/limits, “event policies” can be thought of as altering the severity distribution
- Incorporating this mitigation technique into the quantification analysis can significantly affect the tail of the operational loss distribution
- Quantification techniques discussed above provide firms with the framework to determine appropriate insurance coverage

# Benefits of Quantifying OpRisk

- Allows banks to identify operational loss outcomes that they have exposure to, but have yet to experience.
  - example: bad cluster of high frequency, low impact events
- Provides a framework for modeling extreme events.
  - “Scenario Analyses” of low frequency, high impact events
  - example: business interruption
- Large potential payoff to banks :
  - Help incorporate the quantification of “risk reduction” into the decision making process of whether to make a particular technological investment or not.
  - Banks that measure and manage operational risk can significantly reduce costs
  - Banks that measure and manage operational risk are likely to be less susceptible to systemic problems



# Significant Challenges for Bank Supervisors

- What modeling assumptions are reasonable?
- Many different types of models will be employed by banks
  - models idiosyncratic to firm
  - models idiosyncratic to business line
  - models idiosyncratic to controls
- Attaining flexible firm-specific modeling and consistency of treatment across organizations will be difficult
- Supervisory staff will need to understand modeling issues as well as the nature of operational risk for different business lines.