



OPERATIONAL RISK  
AND THE  
BASEL II CAPITAL  
ACCORD



# PRESENTATION OUTLINE

- ▶ Description of Operational Risk
  - ▶ Overview of the Basel Capital Accord
  - ▶ The Role of Insurance for Operational Risks
  - ▶ The Taxonomy of Operational Risk
  - ▶ Regulatory Capital for Operational Risk
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# DEFINITION OF OPERATIONAL RISK

## OPERATIONAL RISK

The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events

Focuses on causes of operational risks:

- ▶ internal processes
- ▶ people
- ▶ systems
- ▶ external events

Cause	Definition	Examples
Internal Processes	Losses from failed transactions, client accounts, settlements and every day business processes.	Data entry error Unapproved access Vendor disputes Negligent loss/damage to clients assets
People	Losses caused by an employee or involving employees (intentional or unintentional), or losses caused through the relationship or contact that a firm has with its clients, shareholders, third parties, or regulators.	Unauthorized trading Internal fraud Wrongful termination Harassment Sales discrimination
Systems	Losses arising from disruption of business or system failure due to unavailability of infrastructure or IT.	Hardware or software breakdown Telecommunications failures Programming error Computer virus Utility outage/disruptions
External Events	Losses from the actions of 3rd parties including external fraud, or damage to property or assets, or from change in regulations that would alter the firm's ability to continue doing business.	Natural disasters (hurricane, flood, etc) Terrorism Extortion Credit card fraud Computer crime

# INCREASE IN BANK OP RISK EXPOSURES

- ▶ Globalization
- ▶ Growth of e-commerce
- ▶ Large-scale mergers and acquisitions
- ▶ More highly automated technology
- ▶ Large volume service providers
- ▶ Increased outsourcing
- ▶ Complexity and breadth of products
- ▶ Increased business volume
- ▶ Increased litigation



The growing risks have caused increased focus by banking regulators.



Increased regulatory focus has caused a surge in development by banks in op risk management and measurement.

# BASEL CAPITAL ACCORD

- ▶ Set of standards developed by the Basel Committee in 1988 and enforced and implemented by national supervisors and regulators.
- ▶ The purpose of the Basel Capital Accord is:
  - ▶ Promote safety and soundness of the financial system.
  - ▶ Ensure adequate level of capital in international banking system.
  - ▶ Enhance competitive equality (level the playing field).
- ▶ Established minimum risk-based capital requirements.
- ▶ Basel Committee members come from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, United Kingdom and United States.
- ▶ Over 100 countries have implemented the Basel Accord.

# PROPOSED NEW BASEL ACCORD

- ▶ Replaced the 1988 Basel accord.
- ▶ Finalized in June, 2004 and updated July 2006.
- ▶ Implementation scheduled for 2005, but approved in US in 2006-7.
- ▶ Include a new capital charge for operational risks in addition to credit and market risks.

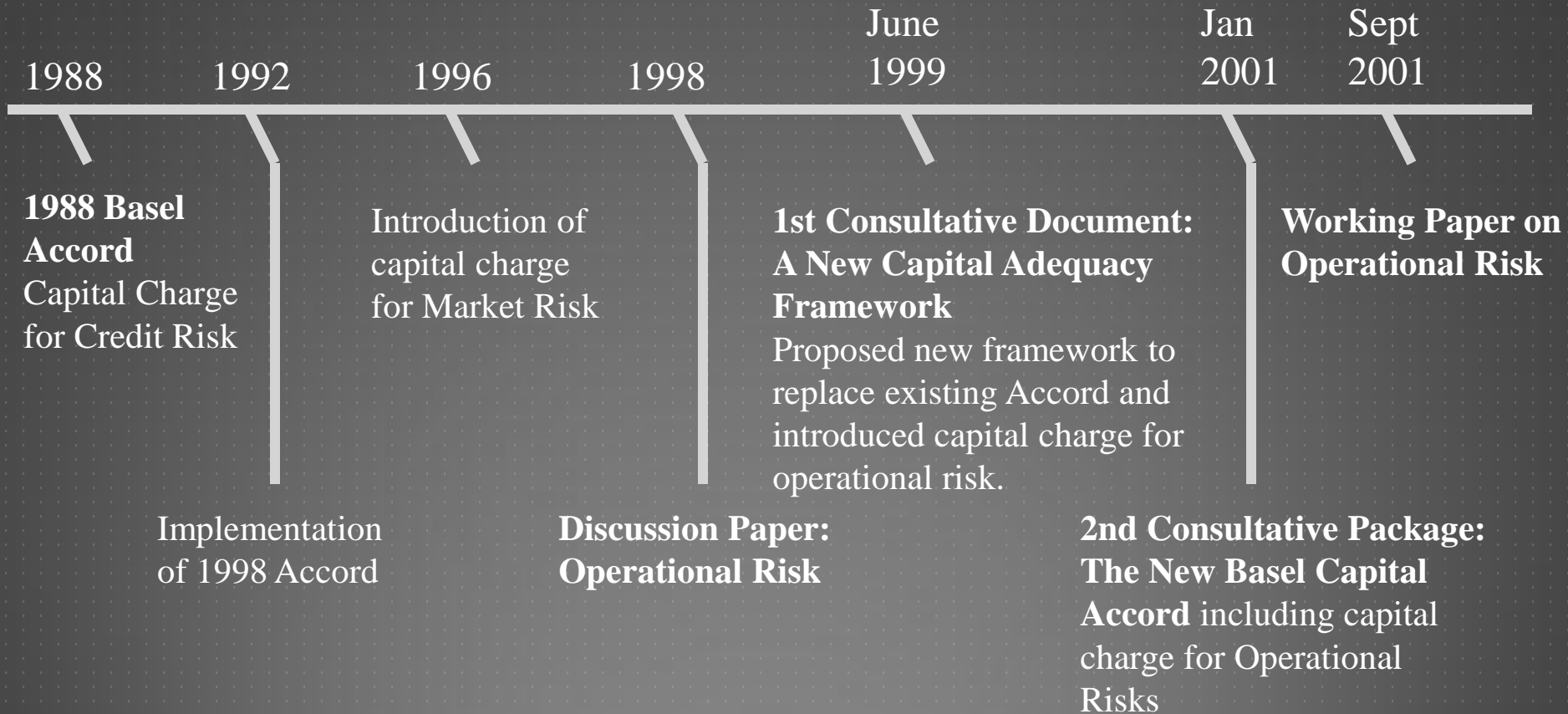
## **Basel I Accord**

- Credit Risk
- Market Risk

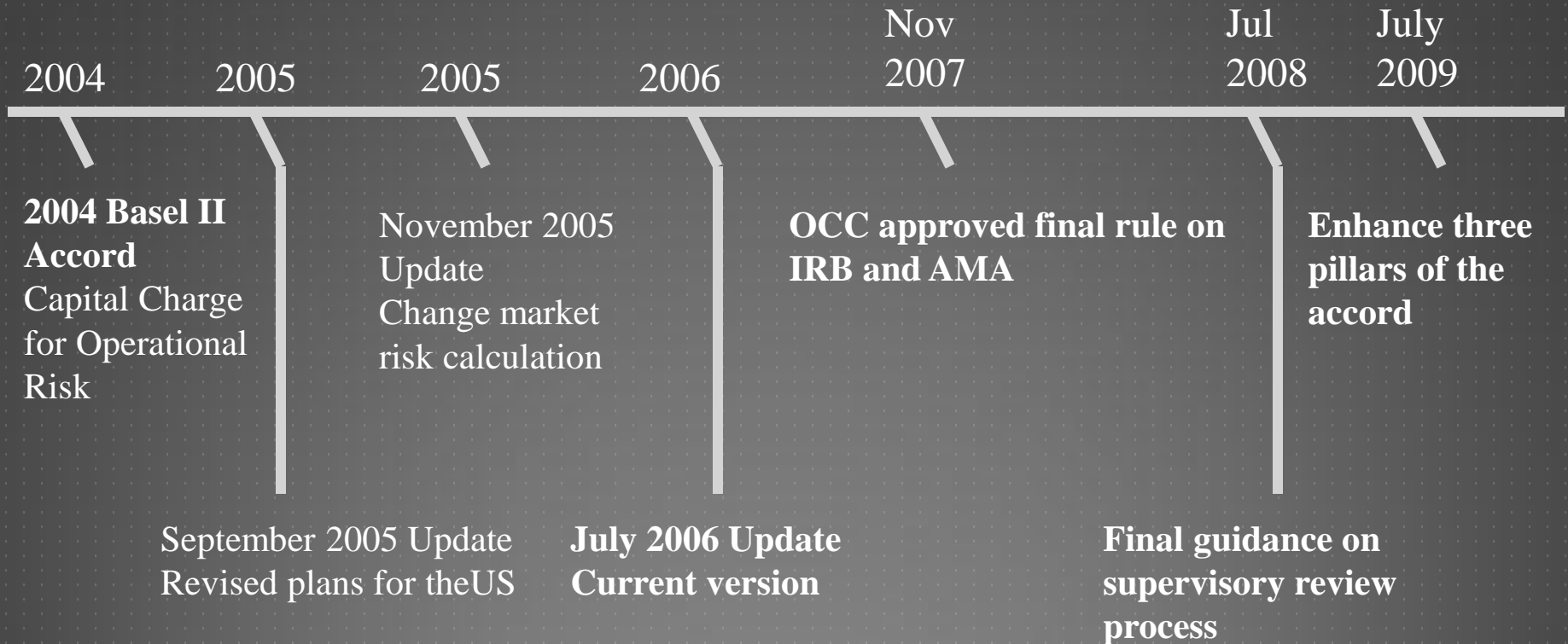
## **Basel II Accord**

- Credit Risk
- Market Risk
- Operational Risk

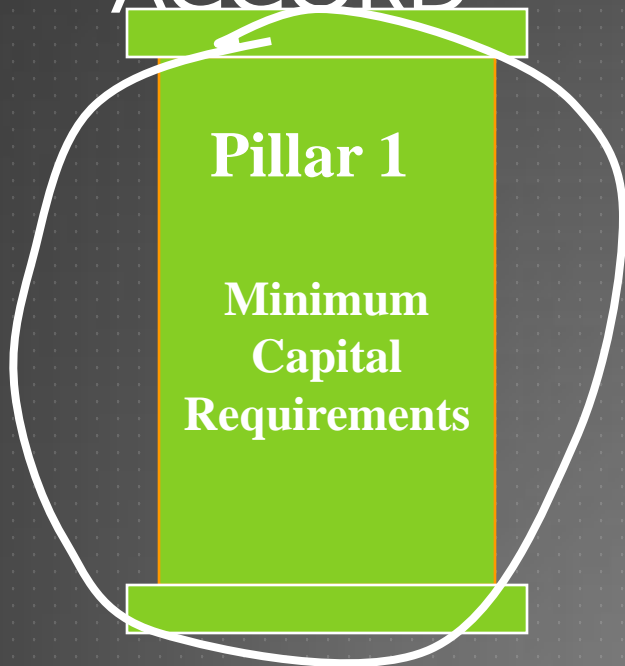
# DEVELOPMENT OF THE BASEL ACCORD



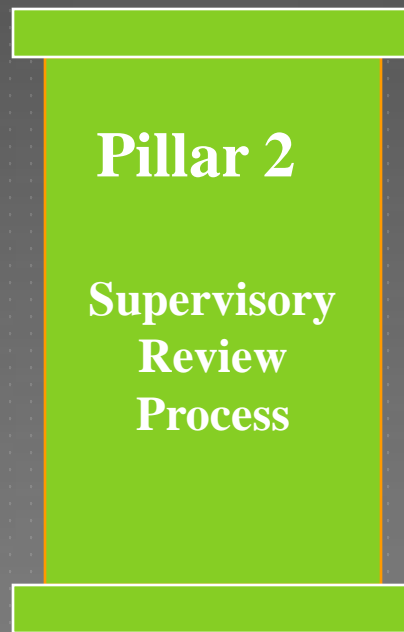
# DEVELOPMENT OF THE BASEL ACCORD



# THE PILLAR STRUCTURE OF THE NEW ACCORD



Top down activity based capital charge imposed on banks based upon the results of an assessment of losses attributed to operational risk and that mapped the institution's operational risk profile.




Enhancement to the supervisory review process. Stresses the importance of bank management developing an internal capital assessment process.



Enlisting active involvement of the financial services community to invoke some sort of market discipline over member institutions. (Disclosure Requirements)

# WHY REGULATORY CAPITAL?

- ▶ Capital reduces the risk of failure by acting as a cushion against losses and by providing access to financial markets to meet liquidity needs.
  - ▶ Provides an incentive for prudent risk management.
- 

# PILLAR I - MINIMUM CAPITAL REQUIREMENT

$$\frac{\text{Total Capital}}{\text{Credit Risk} + \text{Market Risk} + \text{Operational Risk}} = \text{Capital Ratio (minimum 8\%)}$$

Revised      Unchanged      New

The new Accord focuses on revising only the denominator (risk-weighted assets), the definition and requirements for capital are unchanged from the original Accord.

# ROLE OF INSURANCE FOR OP RISKS

D&O

Property

E&O

GL

Fidelity  
Bond

Computer  
Crime

EPLI

Unauthorized  
Trading

“Insurance is an effective tool for mitigating operational risks by reducing the economic impact of operational losses, and therefore should have explicit recognition within the capital framework of the new Basel Capital Accord to appropriately reflect the risk profile of institutions and encourage prudent and sound risk management.”

*November 2001, “Insurance of Operational Risk under the New Basel Capital Accord”, a working paper submitted by Insurance Companies.*

# INSURANCE AS RISK MANAGEMENT TOOL

Direct Benefits	Indirect Benefits
<ul style="list-style-type: none"><li>- Reduces financial impact of loss (severity).</li></ul>	<ul style="list-style-type: none"><li>- Loss control and risk management services provided by insurers.</li><li>- External monitoring and investigation of risks by insurance company.</li><li>- The cost and availability of insurance acts as incentive to reduce losses.</li><li>- Causes awareness of the risks, must make decisions about what to retain and what to transfer.</li></ul>

# INSURANCE UNDER THE NEW ACCORD

“Specifically, insurance could be used to externalise the risk of potentially “low frequency, high severity” losses, such as errors and omissions (including processing errors), physical loss of securities, and fraud. The Committee agrees that, in principal, such mitigation should be reflected in the capital requirements for operational risk.”

*January 2001, Basel Committee on Banking Supervision, “Consultative Document on Operational Risk”*

# INSURANCE INDUSTRY RESPONSE

- ▶ Formed insurance industry working group.
- ▶ Current participating companies are Allianz, AXA, Chubb, Mitsui Sumitomo, Munich Re, Swiss Re, Tokio Marine and Fire, XL, Yasuda Fire and Marine, and Zurich.

# TAXONOMY AND REGULATORY CAPITAL

- The Taxonomy of Operational Risk
  - Definition
  - Categories
  - Mapping
- Regulatory Capital for Operational Risk
  - Calculating by Formula
  - Measuring
  - Incorporating Relief for Insurance

# DEFINITION OF OPERATIONAL RISK

## ▶ Regulatory definition

*“The risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events.”*

## ▶ Supplementary explanation

*“strategic and reputational risk are not included”*

*“the definition does not include systemic risk”*

*“the capital charge does not intend to cover all indirect loss and opportunity costs”*

## ▶ Further clarification of certain terms is required

- ▶ *Indirect loss, opportunity cost and reputational risk shall be renamed “loss of income and increase in cost of working”*
- ▶ *strategic risk?*
- ▶ *systemic risk?*

# CATEGORIES OF OPERATIONAL RISK

- ▶ Originally the Regulators offered the definition and eight event types
  - ▶ Internal Fraud
  - ▶ External Fraud
  - ▶ Employment Practices and Workplace Safety
  - ▶ Clients, Products and Business Practices
  - ▶ Damage to Physical Assets
  - ▶ Business Disruption and System Failures
  - ▶ Execution, Delivery and Process Management
- ▶ The Insurance industry working group thought it would be helpful to “connect the dots” from the definition, through the event types, to insurance products

# TAXONOMY: FROM DEFINITION TO EVENT TYPES

<i>Definition</i>		<i>Event Types</i>
<b>OPERATIONAL RISK</b>	<b>PEOPLE</b>	Internal Acts
		Employment Practices & Workplace Safety
		Clients, Products and Business Practices
	<b>PROCESSES</b>	Execution, Delivery & Process Management
	<b>SYSTEMS</b>	IT and Utilities
	<b>EXTERNAL EVENTS</b>	Damage to or Loss of Assets
External Acts		

**Regulatory Definition:** *“The risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events.”*

# TAXONOMY: FROM EVENT TYPES TO EXAMPLES

<i>Event Type</i>	<i>Categories</i>	<i>Examples</i>
<b>EMPLOYMENT PRACTICES &amp; WORKPLACE SAFETY</b>	<b>EMPLOYEE RELATIONS</b>	Compensation, benefit, termination issues
		Organized labor activity
		Hostile environment
		Wrongful termination
		etc
	<b>SAFE ENVIRONMENT-WORKERS &amp; THIRD PARTY</b>	General Liability
		Employee health & safety rules events
		Workers compensation - Medical
		Workers compensation - Indemnity
		etc
	<b>DIVERSITY &amp; DISCRIMINATION</b>	Sexual-based
		Race-based
Age-based		
Religion-based		
etc		

# REGULATORY CAPITAL

- Top Down vs. Bottom Up Approaches
- Proposed Capital Formulas
- The Loss Distribution Approach
- Proposed Capital Relief Formula

# • TOP DOWN VS. BOTTOM UP CAPITAL

## • TOP DOWN

- Start with a given aggregate capital amount for the industry
- Allocate this to risk source: market, credit and operational
- Allocate each piece to individual financial institutions

## • BOTTOM UP

- Identify each source of risk
- Develop a method for measuring it's magnitude
- Derive capital from this measure

# THE REGULATORY CAPITAL “BALL PARK”

- The regulators have already indicated the ball park for regulatory operational risk capital
- They’ve said the existing Accord already implicitly contemplates operational risk
- Therefore, aggregate regulatory capital should not change with the new capital accord
- In September the BIS suggested that 12% appeared to be a reasonable amount of total existing regulatory capital to associate with operational risk

# PROPOSED CAPITAL APPROACHES

- Basic Indicator *top down*
- Standardized ↓
- Internal Measurement ↓
- Loss Distribution *bottom up*

# BASIC INDICATOR APPROACH

$$K_{\text{BIA}} = \text{EI} * \alpha$$

Where

$K_{\text{BIA}}$  = the capital charge under the Basic Indicator Approach

$\text{EI}$  = the level of an exposure indicator for the whole institution, provisionally gross income

$\alpha$  = a fixed percentage, set by the Committee, relating the industry-wide level of required capital to the industry-wide level of the indicator

Banks using the Basic Indicator Approach have to hold capital for operational risk equal to a fixed percentage (denoted alpha) of a single indicator. The current proposal for this indicator is gross income.

# ANALYSIS OF QIS DATA: BASIC INDICATOR APPROACH

(BASED ON 12% OF MINIMUM REGULATORY CAPITAL)

	(1)	(2)	(3)	(4)
	<b>25th Percentile</b>	<b>Median</b>	<b>Mean</b>	<b>75th Percentile</b>
All Banks	0.137	0.190	0.221	0.246

For the Basic Indicator Approach, alphas are calculated as 12 percent of minimum regulatory capital divided by gross income.

# BUSINESS LINES

- ▶ Corporate Finance
- ▶ Trading & Sales
- ▶ Retail Banking
- ▶ Commercial Banking
- ▶ Payment and Settlements
- ▶ Agency Services & Custody
- ▶ Retail Brokerage
- ▶ Asset Management

# STANDARDIZED APPROACH

$$K_{TSA} = \Sigma(EI_{1-8} * \beta_{1-8})$$

Where:

$K_{TSA}$  = the capital charge under the Standardized Approach

$EI_{1-8}$  = the level of an exposure indicator for each of the 8 business lines

$\beta_{1-8}$  = a fixed percentage, set by the Committee, relating the level of required capital to the level of the gross income for each of the 8 business lines

The total capital charge is calculated as the simple summation of the regulatory capital charges across each of the business lines.

# ANALYSIS OF QIS DATA: THE STANDARDIZED APPROACH

(BASED ON 12% OF MINIMUM REGULATORY CAPITAL)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Median	Mean	Weighted Average	Standard Deviation	Weighted Average Standard Deviation	Minimum	25th Percentile	75th Percentile	Maximum	Number
Corporate Finance	0.131	0.236	0.120	0.249	0.089	0.035	0.063	0.361	0.905	19
Trading & Sales	0.171	0.241	0.202	0.183	0.129	0.023	0.123	0.391	0.775	26
Retail Banking	0.125	0.127	0.110	0.127	0.066	0.008	0.087	0.168	0.342	24
Commercial Banking	0.132	0.169	0.152	0.116	0.096	0.048	0.094	0.211	0.507	27
Payment & Settlement	0.208	0.203	0.185	0.128	0.068	0.003	0.100	0.248	0.447	15
Agency Services & Custody	0.174	0.232	0.183	0.218	0.154	0.056	0.098	0.217	0.901	14
Retail Brokerage	0.113	0.149	0.161	0.073	0.066	0.050	0.097	0.199	0.283	15
Asset Management	0.133	0.185	0.152	0.167	0.141	0.033	0.079	0.210	0.659	22

# THE OPERATIONAL RISK MATRIX

## BUSINESS LINES

Corporate Finance

Trading & Sales

Retail Banking

Commercial Banking

Payment and Settlements

Agency Services & Custody

Retail Brokerage

Asset Management

## EVENT TYPES

Internal Fraud

External Fraud

Employment Practices

Clients, Products ...

Damage to Physical ...

Business Disruption ...

Execution ...

# THE INTERNAL MEASUREMENT APPROACH

$$K_{\text{IMA}} = \sum (EI_{ij} * PE_{ij} * LGE_{ij} * \gamma_{ij})$$

**Where:**

**$K_{\text{IMA}}$**  = the capital charge under the Internal Measurement Approach

**$EI_{ij}$**  = the level of an exposure indicator for each business line and event type combination

**$PE_{ij}$**  = the probability of an event given one unit of exposure, for each business line and event type combination

**$LGE_{ij}$**  = the average size of a loss given an event for each business line and event type combination

**$\gamma_{ij}$**  = the ratio of capital to expected loss for each business line and event type combination

$\gamma_{ij}$  could be an industry-wide number developed by the regulator, or it could be an institution specific number developed by individual institutions.

# THE LOSS DISTRIBUTION APPROACH

- Background
  - Used by the Most Sophisticated Banks
  - Requires Advanced Knowledge and Lots of Data
- Brief Overview
  - Requires plenty of data
  - Based on the Collective Risk model
  - Is as much an art as it is a science
  - Graphical illustration of required capital

# AN LDA REQUIRES PLENTY OF DATA

Month/Year	Loss Severity [in thousand\$]	Company/Entity	Cause-Effect-Chains	Norm.-/scal.-param.	Non-scaled value
11/1998	5684	B	Unavailability or loss of property // Fire // Self Ignition // Flammab	RQ	42
9/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Flammab	RQ	70
10/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Flammab	RQ	81
8/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Flammab	RQ	41
7/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Flammab	RQ	41
1/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	65
2/1998	4522	C	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	65
3/1998	4522	A	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	89
4/2000	4522	A	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	88
12/1992	13	C	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	65
6/1996	4522	A	Unavailability or loss of property // Fire // Self Ignition // Chemical	RQ	81
8/1998	1535	C	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	65
7/1997	123	B	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	45
5/1993	13	D	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	80
10/1992	4864	A	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	50
12/1995	1536	B	Unavailability or loss of property // Fire // Self Ignition // Coal	RQ	50
11/1992	136	C	Unavailability or loss of property // Fire // Self Ignition // Agricultu	RQ	65
9/1998	15	B	Unavailability or loss of property // Fire // Self Ignition // Agricultu	RQ	42
2/1993	1658	C	Unavailability or loss of property // Fire // Overheating // Lamps	RQ	68
11/1991	765	D	Unavailability or loss of property // Fire // Overheating // Lamps	RQ	75
1/1992	136	A	Unavailability or loss of property // Fire // Overheating // Lamps	RQ	50
3/2000	15	A	Unavailability or loss of property // Fire // Overheating // Lamps	RQ	88
6/2000	2444	C	Unavailability or loss of property // Fire // Overheating // Heatin	RQ	72
5/1998	155	C	Unavailability or loss of property // Fire // Overheating // Heatin	RQ	65
4/1993	16	B	Unavailability or loss of property // Fire // Overheating // Heatin	RQ	43

Adjusted Net Loss  
(Discounted  
Currency adjusted  
incl. Risk Transfer)

Gross Loss

Loss Event Type

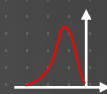
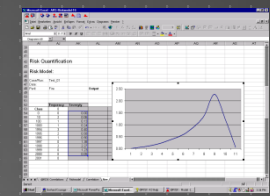
Business Line

Exposure Indicator(s)

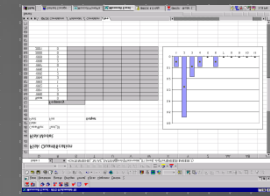
Type of Relief / Policy

Risk Transfer / Relief Indicator(s)  
e.g. Premiums / Limits

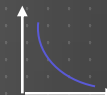
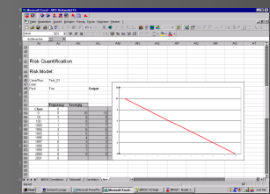
Loss Effect Type



Severity



Frequency



Time Trigger

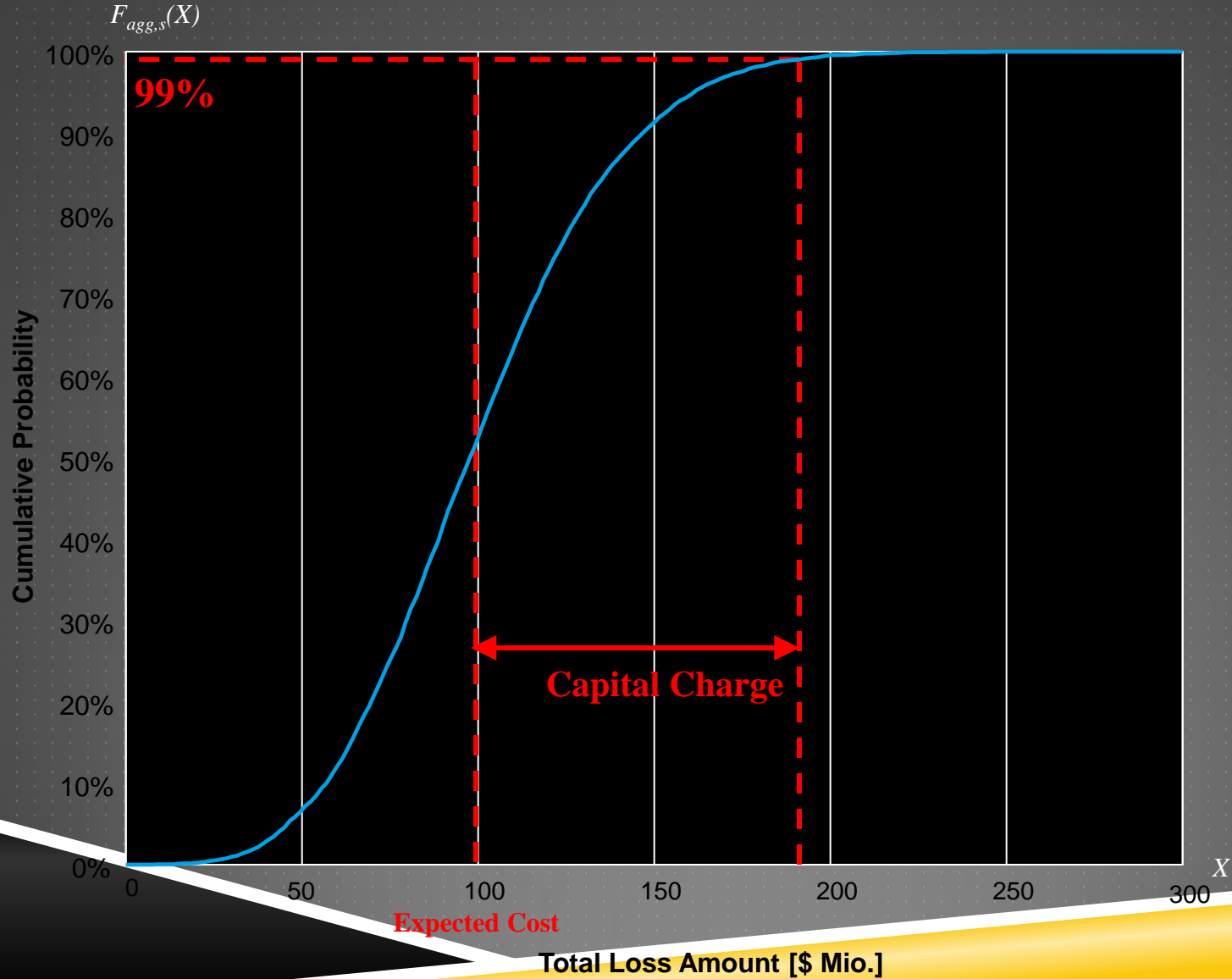
# THE COLLECTIVE RISK MODEL

- $C = X_1 + X_2 + X_3 + \dots + X_N$ 
  - Where N is the frequency distribution
  - And X is the severity distribution
  - And C is the aggregate loss distribution
- A separate model should be fit for each homogeneous grouping of data; hopefully these might correspond to the business line / event type combinations stipulated by regulators
- the model has some nice mathematical properties
  - $E[C] = E[N] * E[X]$
  - $VAR[C] = E[N] * VAR[X] + E[X]^2 * VAR[N]$
  - Assuming N is Poisson:  $VAR[C] = E[N] * (VAR[X] + E[X]^2)$

# ART MORE THAN SCIENCE

- ▶ External Data
  - ▶ Scenario Analysis
  - ▶ Expert Opinion
  - ▶ Adjustments for Changes in Risk Management Policies
  - ▶ Adjustments for Insurance
- 

# The Aggregate Distribution and Required Capital



# PROPOSED CAPITAL RELIEF FORMULAS (FOR INSURANCE)

- Basic Indicator Approach
  - Premium Formula
  - Limit Formula
- Standardized Approach
  - Same as Basic Indicator Approach
- Internal Measurement Approach
  - Just re-evaluate the parameters

# PREMIUM APPROACH

$$K_{RT} = P * (1 - P / \text{Limit}) * \lambda * CR$$

Where

$K_{RT}$  = the capital relief for insurance

$P$  = the premium for a contract that transfers operational risk

$\lambda$  = a factor that reflects the relationship between insurance premium and capital transferred

$CR$  = a factor to reflect the credit risk of the insurance provider

# LIMIT APPROACH

$$K_{RT} = \sum (L_P - EL_P) * B_P * CR_P$$

Where

$K_{RT}$  = the capital relief for insurance

$L$  = the limit of the contract that transfers operational risk

$EL$  = the expected losses on the contract

$B$  = a factor that reflects the contract's breadth of coverage

$CR$  = a factor to reflect the credit risk of the insurance provider

# THE INTERNAL MEASUREMENT APPROACH

$$K_{\text{IMA}} = \sum (EI_{ij} * PE_{ij} * LGE_{ij} * \gamma_{ij})$$

Where:

$K_{\text{IMA}}$  = the capital charge under the Internal Measurement Approach

$EI_{ij}$  = the level of an exposure indicator for each business line and event type combination

$PE_{ij}$  = the probability of an event given one unit of exposure, for each business line and event type combination

$LGE_{ij}$  = the average size of a loss given an event for each business line and event type combination

$\gamma_{ij}$  = the ratio of capital to expected loss for each business line and event type combination

TO REFLECT INSURANCE, BANKS WOULD CALCULATE *PE* AND *LGE* NET OF INSURANCE RECOVERIES AND THE REGULATORS WOULD PROMULGATE  $\gamma$ 's THAT CONTEMPLATE INSURANCE

# TIMETABLE FOR COMPLETION OF NEW ACCORD

Early 2002	3 <sup>rd</sup> Consultative Package A complete and fully specified proposal for an additional round of comments
Mid 2002	Final comment period
Late2002	Finalization of the new Accord
2005	Implementation of the new Accord