

Programme on Operational Risk Management

Operational Risk & Advanced Approaches Issues and Challenges

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Operational Risk History

Operational risk is as old as the business itself

Trade off between risk and opportunity

Risk management recognised as a valuable discipline – terminology differed

Recognised - but not as a risk that could propel operational disruptions serious enough to cause business failure and catastrophic losses

Beginning of awareness on this count in early nineties

Nuclear energy, oil and chemical industries – some form of structure for risk management as a discipline

Banker's Trust – 1992

Avoid risk, prevent failures, disruptions – as distinct from risk assessment, measurement, monitoring and control

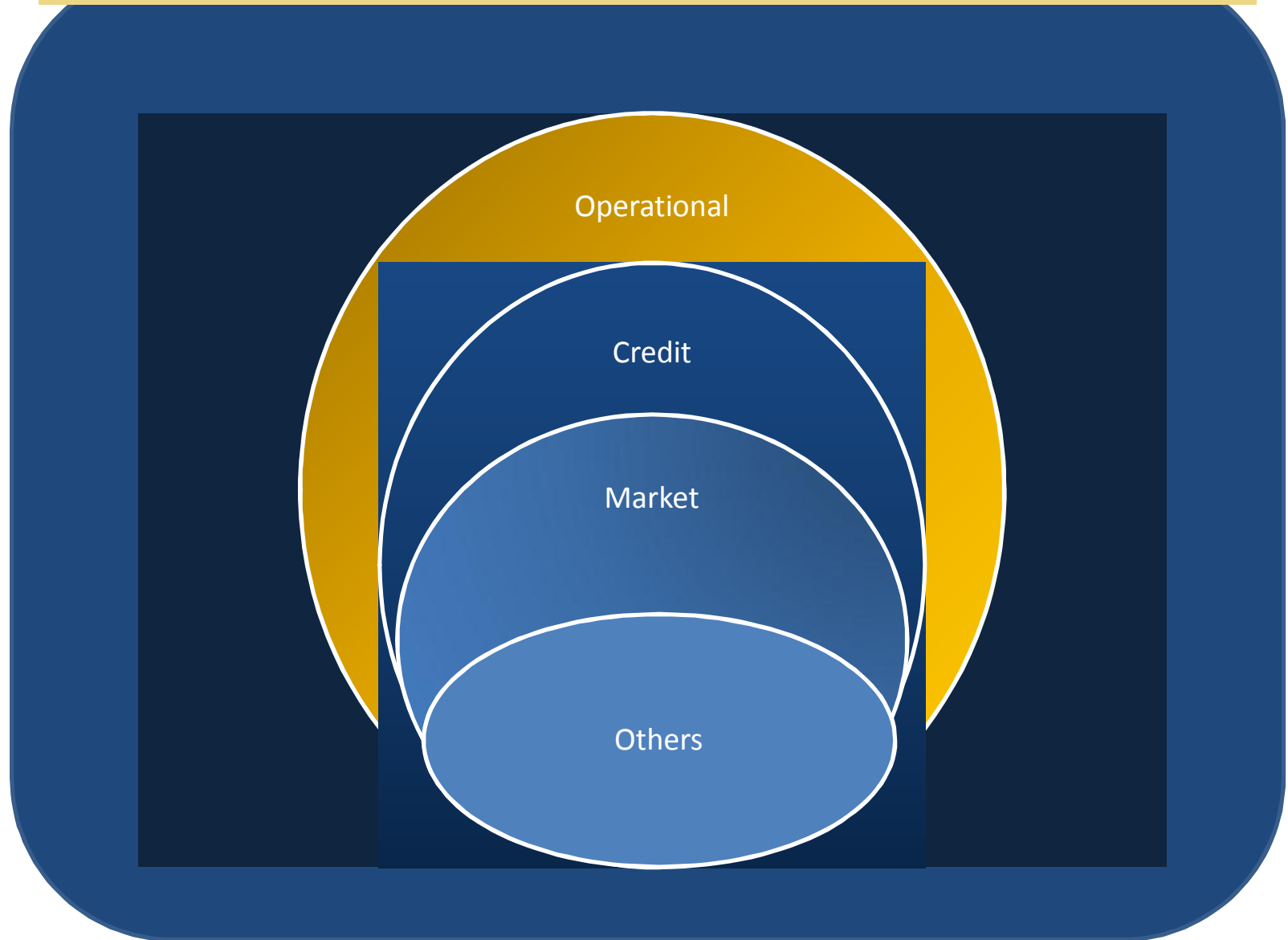
Australian / New Zealand RM Standards – 1995 – revised in 1999

Basel II in 2004, formally incorporated operational risk capital in the risk based capital framework introduced for banks way back in 1998 with Basel

Financial Sector Risk Firmament



Financial Sector Risk Firmament



Crisis & the Operational Risk Issues

Catapulted to forefront – most pervasive and slippery

OR goes beyond operations and processes to encompass all aspects of business risk including strategic and reputational risks.

As broad as business risk – therefore as many ways to manage it

Hidden but important cause for the crisis - Many of the vast losses incurred were, in part, precipitated by systemic operational risk

Many of the losses that are ascribed to other risks have strong operational risk component, in particular, people-related risks

The 'people factor' is a crucial operational risk driver and must not be underestimated – skills and seasoned judgement is necessary across the enterprise functions and on front lines

OR governance , oversight and risk management are key components in ORMF and must be embedded institutionally

Operational risk is idiosyncratic and situational - No single RM format

Some High Profile OR Loss Events

Societe
General

January 2008: lost approx. €4.9 billion closing out positions over three days - fraudulent transactions created by Jerome Kerviel, a trader with the company.

UBS

September 2011: , Massive loss, originally estimated at US\$2 bn -unauthorized trading allegedly by Kweku Adoboli. Failure to act on a warning issued by its computer system trading.

Barrings

\$1.3 billion loss attributed to unauthorized trading , proved to be catastrophic for the institution and led to bankruptcy

Madoff
investment

December 2008: former NASDAQ Chairman Bernard Madoff admitted that the wealth management arm of his business was an elaborate Ponzi Scheme. Fraud size estimated to be approx. \$64.8 billion,

Goldman
Sachs

April 2010: Charged by SEC of defrauding investors by misstating and omitting key facts about a financial product tied to subprime mortgages as the U.S. housing market was beginning to falter.

JP Morgan
Chase

May 2012, :

original estimated loss of \$2 billion has since substantially increased in size and is now speculated to potentially reach \$9 billion

LIBOR
manipulation

Barclays, and potentially other banks, manipulated the published LIBOR, EURIBOR and TIBOR rates for their own purposes

Impacts of some
other significant
losses

National Australia Bank	\$360 million AU	2004
Allied Irish Bank	\$691 million	2002
Sumitomo Corporation	¥2.6 billion	1996
Barings Bank	£827 million	1995
MF Global		
Global Payments		

Multiple Drivers

- ❑ Frauds – one major known catalyst behind operational risk. But the crisis and the incidents of losses in the previous slide revealed many more Serious control weaknesses or defects
- ❑ Insufficient independent challenge
- ❑ Major technological glitches
- ❑ Inadequate risk management systems / enterprise culture
- ❑ weakness in financial reporting, communications and information systems.
- ❑ Excessive risk taking for quick returns – risk appetite not clearly / objectively defined and adherence not meticulously monitored
- ❑ Laxity in governance, oversight and monitoring mechanism
- ❑ Remuneration policies that encouraged incentives for undue risk taking

- Increasing Financial innovation and complexity
- Increased globalisation and connectedness
- Product sophistication
- Liberalisation
- Increasing business volumes and activity – outside the scope of traditional maturity and liquidity transformation function
- Excessive trading
- Use of mathematical models for product innovation and management
 - operational risk was virtually everywhere – unseen unheard but nonetheless thriving
- Can be assumed that the failure occurred in any or all of the three lines of defence management activities.

Operational Risk Challenges

All pervasive

Elusive and 'most exotic'

Hidden, camouflaged

May not manifest directly or openly

Many more risk drivers than credit or market risk

Basel II – narrow or complex definition??

Many other forms

Multifarious dimensions

Idiosyncratic and changing

Greatly influenced by internal and external business environment

Constant monitoring, review of processes and strategies to upscale or adapt the measurement and management methods.

Basel II OR Definition

Credit Risk

Concentration risk
Default Risk
Pricing Risk

Market Risk

Interest rate risk
Forex risk
Yield curve Risk
Basis risk

Operational
Risk

Process Risk
People Risk
Systems
External factors
Legal Risk
Others? ?

Other forms?

transaction processing
risk

Outsourcing Risk

terrorist financing risk

technology risk

Process change risk

Compliance Risk

Physical Security Risk

Strategic and Reputation Risk

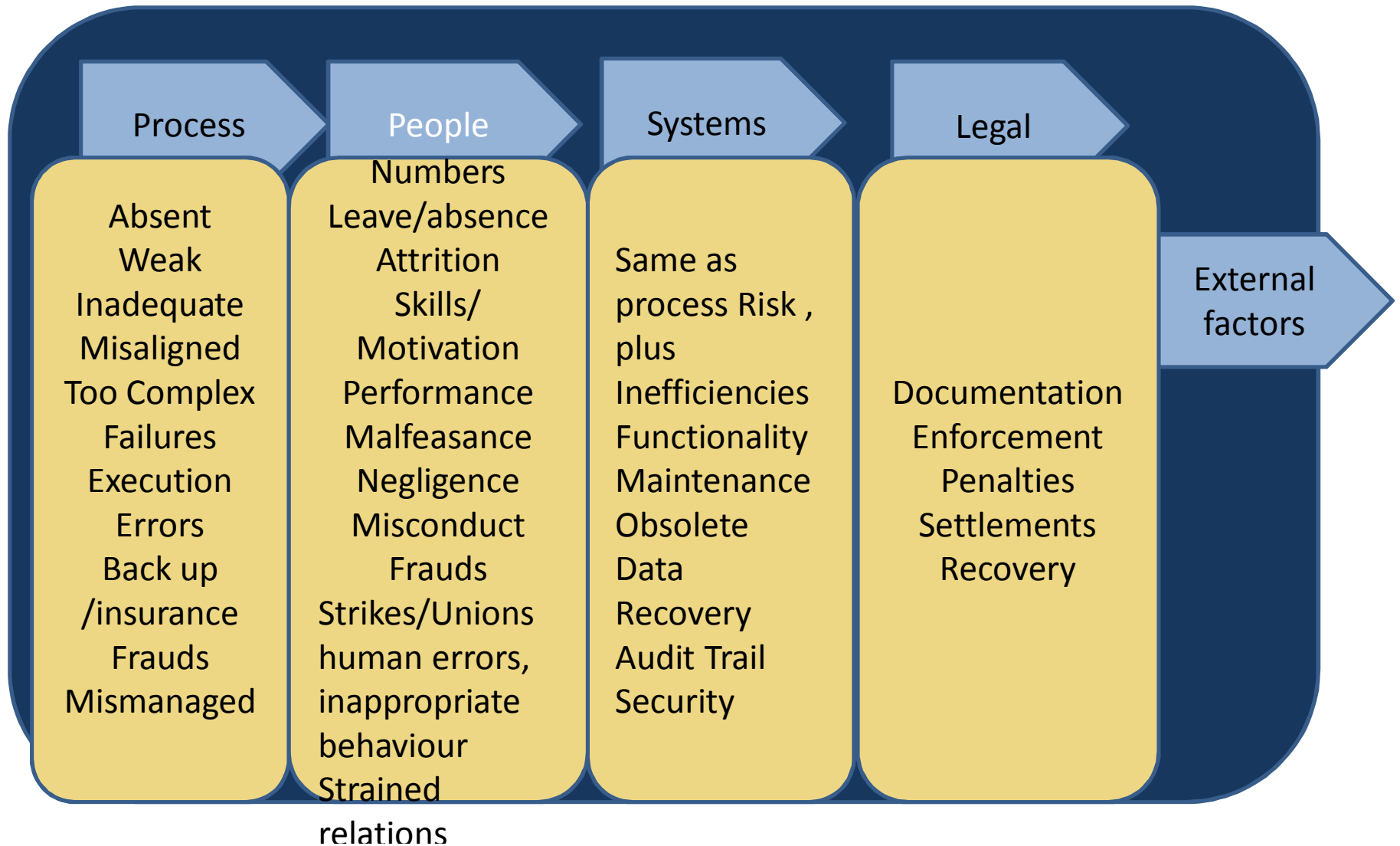
money laundering risk

Information/security risk

model /modelling risk

rogue trading and self-dealing

Multifarious Dimensions



Basel II – Operational Risk

Base II for the first time factored in the Operational Risk component in the New Capital Adequacy Framework

Pillar 1 of this framework incorporates a new capital charge for operational risk with a choice of approaches. Three approaches in ascending order of complexity and risk sensitivity- BIA, TSA and AMA

Capital saving with higher risk intensity / contribute to the effectiveness of supervision

Proxy indicator is Gross Income with applicable Alpha and Beta. 15% and 12-18% of GI as the capital charge for Operational Risk

AMA: Most sophisticated – allows 3 sub approaches: the Scorecard Approach, the Internal Measurement Approach and the Loss Distribution Approach allows use of Internal Models for capital OR measurement and capital estimation. Based on both quantitative and qualitative elements

However, many aspects not considered amenable to measurement and hence left to be addressed under Pillar 2

Challenges in usage of GI as proxy indicators

BIA and TSA – simpler approaches - but charge more capital. Risk indicator based on income level and not on risk exposures

Questionable link to the risk of an expected loss due to internal or external events.

originally established during a period of time with limited operational risk data to support the various underlying components

BIA, a very broad proxy indicator - one size fits all, doesn't consider risks separately for different activities

On average, may be under-calibrated, especially for large and complex banks

Risk indicator is based on income level and not on risk exposures

Ambiguity in BL descriptions – activity allocations to lower Beta BL

Negative Gross Income allowed to be off set against positive

Income linked to GI – No incentive for improving ORM practices

A

M

A

risk measure generated by the bank's internal operational risk measurement system using the quantitative and qualitative criteria for the AMA

No standardised, tested or accepted Best Practices – widely differing approaches across jurisdictions and institutions

few efforts in the past to quantify and capture operational risk – difficult to construct complete OR portfolio for AMA modelling

combines four elements in an integrated approach – Internal data, external data, scenario analysis and Business environment and internal control factors (BEICFs)

Allows usage of three approaches – Score Card Based, Internal measurement Method and Loss Distribution Approach

Introduces complexity, sophistication, greater risk sensitivity and accuracy but also – inconsistency and uncertainty

AMA

- Sophistication and complexity - the biggest challenges
- Flexibility
- Lack of practices for operational risk measurement and management
- widely differing approaches
- dearth of established and time-tested models to capture operational risk.
- measuring operational risk much more difficult than measuring market or credit risk
- few past efforts to quantify and capture operational risk despite its predominance in every field of the banks
- therefore difficult to construct a complete portfolio of operational risk exposures for modeling requirements under AMA for OR Risk Measurement under Basel II norms
- Data is affected by a continuous change of organizations and the environment in which they operate

Loss Distribution Approach

Quantitative Elements

Data Issues – Models would be as good as the data

Historical Data – Internal Loss data

- External Loss data

Modelling and Quantification Issues

Scenario Analysis

Qualitative Elements

Scenario analysis

Business Environment and Control factors

Internal Governance Issues

Other issues/challenges

Internal Loss Data

Critical component of the ORMS and ORMF

Data vs. model maturity

role in defining institution specific risk management processes – reveal gaps in control standards

Can provide forward looking estimation of the likely future operational risk events that the institution can be subjected to unless the leanings are addressed in an effective manner

Provides and insight on the risk drivers with in an institution and their relationship with its size, business structure, strength of the risk management framework and control quality

In the op risk management firmament perfect data does not exist and the best available data suffers from many deficiencies/ weaknesses and insufficiencies

So, many challenges ----

Data availability and sufficiency

Data Quality, consistency and reliability

Maturity of data collection methods

Divergence in data management practices

Data omission, errors, comparability

Data/ truncation bias/Reporting delays

Classification of data set is important –standardisation – 8x7 matrix

Exogenous and endogenous variation - Heterogeneity across banks policies, processes, risk sources, environment, business models, size , sophistication and complexity

-conspire to defy a consistent measure and obscure the comparability of cross-sectional risk estimation.

meaningful and scientific usage of data

Impact for frequency and severity estimates and capital computation

Data Characteristics

- **Leptokurtosis**
 - **Distinct Body and Tail**
 - **Concentration of high frequency/ low severity losses in the body**
 - **High severity data few and scattered**
 - **As such both the body and tail have distinct distributional assumptions - the data is not identically distributed.**
 - **Data insufficiency for modelling the tail region by far the biggest challenge in AMA**
 - **non – homogeneity of distributions**
 - **Need to increase sample size**
- Need for modelling correlations among different units of measures – overlap in loss events . This may largely be based on judgement and therefore impact quality of internal data and therefore the quality of internal data**

External Loss Data

- ❑ Internal Loss data insufficient to fill the matrix
- ❑ Scenarios and external data to supplement
- ❑ absence of pooled industry data - data from public domain eg electronic and print media.
- ❑ may not be complete and suffers from reporting and other biases
- ❑ historical loss events that have occurred outside of the institution - very different from the internal loss experience of the institution need for scaling
- ❑ Scaling – judgemental element - subjectivity – scope for errors
- ❑ not be enough data points in external data
- ❑ Cherry picking of losses to suit its requirements – justification why certain data points are not being considered/being excluded

Scenario Analysis


- Complimentary to the Loss Distribution Approach (LDA)
 - Partially address data insufficiency issues
- A method for assessing whether a financial institution will be able to bear exceptional risk losses – exceptional but plausible losses
 - Tries to navigate possible situations & events that can impact an entity in the future
- Initiate steps to manage the identified risks – i) capital, ii) controls & iii) risk reduction
- A tool which if used properly and systematically can bring to light many important aspects of a situation that would otherwise be ignored
- Correct interpretation consistent with loss experience of the institution with regard to both frequency and severity of loss
 - Can serve as an important tool in decision making, loss measurement and risk management as also for scaling of the external data

Scenario Analysis

- Based on Expert Opinion – subjectivity
 - Analyse very low probability but plausible loss events
 - But may not include all possible risk factors and features
- Results are specific to the profile of a financial institution and vary across institutions
- Address Catastrophic events – losses much higher than the magnitude of historical losses
- often unacceptably large, difficult to interpret and hence dismissed or ignored
 - Bad scenarios and irrelevant assumptions can generate losses irrelevant to the institutions risk and loss profile
- Challenge of using scenario analysis results as a direct input to the internal data driven operational risk capital model
 - Aggregation with the historical loss data, Aggregation of outputs from historical and hypothetical scenarios
 - Impact – inaccuracy / underestimation of capital generated
 - Combined effect of scenario data and historical loss data can generate unrealistic capital numbers due to incorrect interpretation of scenario data
- Despite the challenges , useful in evaluation of results at different points so as to judge whether exposures to operational risk have changed

□ Must correspond to reality as much as possible

Modeling / quantification issues

1. The Nature of Operational Loss Distributions
2. Dominance of high-frequency and low severity losses
3. High Measurement Standard
4. Sensitivity to loss categorization (*Granularity of Operational Risk Categories*)
5. Dependence modelling and simulation
6. Regulatory charge across risk classes= summing up?
7. Modelling correlations & their integration
 - 0 to 100% correlation - more than 3 times  in capital
8. Integration of AMA elements
9. Challenge and validation of ORMS

Operational Loss Distributions

1. Frequency and severity separately for each risk category
2. Frequency distributions – relatively simple
3. Data set – major issue, combining other data elements, weighting and scaling, simulations
4. Construction of severity distributions – the most challenging task
 - Single & multiple parametric distributions
 - Divergence in behaviour in the body and tail region
 - Separate body and tail distributions / aggregation
 - Other issues

Severity

1. Light tail and heavy tail distributions
2. Exponential, weibull, Pareto, lognormal
3. Sub lognormal, Generalised Pareto

Measurement Standard

- Extremely high measurement standard at 99.9th percentile
- Presupposes once in a thousand year loss event
- Necessitates large amount of data on individual losses to compute high quantiles of the severity distribution/VAR estimates
- Data for 5-6 years since the regulations came in
- Require a 100- to 200-fold extrapolation beyond the observed data, which is clearly not feasible
- Use of the extreme value theory (EVT), especially for very fat/long tails
- Where does the tail start
- How quickly the loss-generating mechanisms change
- Experiment in modelling but how to reconcile and aggregate the outputs.

Granularity of Operational Risk Categories

- loss distribution approach can be sensitive to how the losses are pooled
- can also be sensitive to the method by which various units of measure are aggregated into the total
- challenge is to arrive at acceptable level of granularity
- Heterogeneity due to data paucity
- Judgment involved in classifications

Integration of AMA elements

Aggregation of outputs across various AMA element :

- internal data,
- relevant external operational risk data,
- scenario analysis and
- Business environment and internal control factors (BEICFs)

Weighting

Capital Adjustments

Directly combining different sources of data into the econometric and statistical estimation of severity causes significant quantitative complexity.

Operational Risk management

- Modelling and quantitative aspects critical to AMA
- But an element within the overall ORM framework
- Concentration on modelling at the cost of Risk Management effort
- Sound OR Management – Primary
- Principles on sound management of OR do not distinguish between the capital computation approaches – TSA vs. AMA
- Risk quantification and capital estimation vs. robustness of OR management practices
- ORMS/ OR numbers must enhance and support the overall OP risk management process and contribute towards strengthening governance and oversight
- Must enable:
 - an overview and understanding of the risk profile of the bank,
 - review sufficiency and adequacy of risk mitigants & control
 - informed / timely decisions, strategic planning
 - downsize the bank operations / activities
 - ensure that the potential for huge, catastrophic and irrecoverable losses can be minimised.

ORM Challenges

- Measuring the ORMF effectiveness and robustness is an intangible
- How to define an optimum framework , ensure effective / good governance
- Despite the score card/ matrix methods adopted, difficult to capture and standardise
- Difficulty in measurement, quantification and comparison
- Subjectivity, judgement and difficulty in standardisation
- Subjectivity based assessment tools
- Managed in intuitive manner agst -explicit and rational system.
- Large number and types of OR management drivers - Vastness involved and different ways for assessing different aspects, which are innumerable –

Challenges

- Measurement of ORMF effectiveness & compliance

 - Board / Sr management understanding & Involvement / support

 - Effectiveness and adequacy of controls/risk mitigants

 - Adequate review and up gradation

 - Adequacy and independence of the Challenge function

 - Appropriateness of risk appetite and tolerance levels

 - Appropriateness of risk culture and embeddedness and percolation

- How to determine business unit engagement

- Compliance at granular and bank level

- Adequacy & consistency of overall risk profile with that of the branch / business unit level

- How the Board and SM would determine that the ORM structure is appropriate and effective

The Way Forward

Infinite Variety - No uniform answer to managing OR
Constantly evolving / Changing – No standardized manual
No uniform list of the risks or the controls to meet these risks

As such idiosyncratic efforts informed by broad guiding principles and industry standards

Important steps in optimizing the OR management efforts could be -

Risk and process analysis - risk experience , causal factors, resources and inputs

Define OR Appetite and OR Tolerance Level - Risk indicators to monitor adherence

Risk measurement and management policies, processes and procedures

Identify control types and quality commensurate with the risk profile

Develop risk management tools – consistent treatment / agreed methodology

Develop common risk language and reporting methods – risk taxonomy and risk library

Document and review

Experience codification and retention

Involve and motivate various risk owners

Target areas most beneficial & avoid duplication of efforts

- ORM framework
- OR Management Structure
- OR Management Infrastructure
- Risk Awareness, Involvement and Independence
- Roles and responsibilities and reporting lines
- Risk Culture and AMA Embeddedness
- Communication and Risk Reporting
- Challenge and Validation
- Experience, skills and Training
- Compliance

Risk , opportunity, costs and benefits

Thank You