Measuring and Managing Operational Risk Under Basel II

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The World Bank
Risk Management Workshop Colombia
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Outline of Presentation
- Introduction to Operational Risk (OR)
- The Basel II OR framework
- Measuring OR under the AMA
- Latest QIS OR Results
- OR Management
- Evaluation, Implications and Conclusions

What is OR?
- Applies to all firms (financial and non-financial)
- Used to be a catch-all phrase for non-financial risks
- Current Basel II definition is “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events”
  - Includes both internal and external event risk
  - Legal risk is also included, but strategic, reputational and systemic risks are not
  - Direct losses are included, but indirect losses (opportunity costs) and near misses are not
  - How many of the costs associated with 9/11 would be captured?
Examples of OR Loss Events

<table>
<thead>
<tr>
<th>Types of OR*</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Internal Fraud | • Unauthorized transaction resulting in monetary loss  
• Embezzlement of funds |
| External Fraud | • Branch robbery  
• Hacking damage (systems security) |
| Employment Practices & Workplace Safety | • Employee discrimination issues  
• Inadequate employee health or safety rules |
| Client, Product & Business Practices | • Money laundering  
• Lender liability from disclosure violations in aggressive sales |
| Damage to Physical Assets | • Natural disasters, e.g. earthquakes  
• Terrorist activities |
| Business Disruptions and System Failures | • Utility outage (e.g. blackout) |
| Execution, Delivery & Process Management | • Data entry error  
• Incomplete or missing legal documents  
• Disputes with vendors/sourcing |

* Based on Basel Committee’s OR loss event classification – see Appendix for details.

Major OR Characteristics

- Partly endogenous
  - Unwanted by-product of corporate activity  
  - Positively related to complexity of operations
- Highly idiosyncratic
  - OR events tend to be less correlated to each other and to other risk types  
  - Less directly linked to business cycles
- In principle (partially) controllable ex ante
- Trade-off is mostly risk vs. cost of avoidance, not risk vs. return

Key Drivers of Interest in OR

- High-profile cases and related negative publicity
  - Examples include Aflac, Barings, Enron etc.
- Basel II’s explicit capital requirements for OR
- Additional complexity brought about by automation, outsourcing, large volume service provision, deregulation, M&A, risk transfer etc.
- Next frontier in enterprise risk management and business applications, e.g. capital allocation, pricing, performance measurement etc.
Size Compared to Other Risks

- OR is sizeable compared to other risk types
  - Its exclusion can make certain businesses appear artificially attractive, e.g. asset management and trading

<table>
<thead>
<tr>
<th>Entity</th>
<th>Methodology</th>
<th>Date</th>
<th>OR Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMG of Basel Committee</td>
<td>Quantitative Impact Survey (QIS2- Tranche 1) of 41 banks</td>
<td>2001</td>
<td>15% (on average) of economic capital</td>
</tr>
<tr>
<td>MOW</td>
<td>Benchmarking study of 10 banks</td>
<td>2001</td>
<td>11% (on average) of economic capital</td>
</tr>
<tr>
<td>MOW</td>
<td>Analysis of OpRisk Analytics loss database</td>
<td>2002</td>
<td>1.05% of risk-weighted assets, corresponding to 17% of the BIS minimum capital requirement</td>
</tr>
<tr>
<td>RMA / FMCG</td>
<td>Survey of 12 banks</td>
<td>2002</td>
<td>11%-17% of economic capital</td>
</tr>
<tr>
<td>Boston Fed*</td>
<td>Analysis of OpRisk Analytics and OpVantage loss databases</td>
<td>2003</td>
<td>“Estimates consistent with the amount of OR capital held by several large institutions”</td>
</tr>
</tbody>
</table>

OR Measurement Pre-Basel II

- OR capital measurement was top-down...
  - ... and subject to various problems
    - Arbitrariness / inconsistency
    - Comparability
    - No link to incentives / risk management

Basel II Framework for OR

- Scope of application
  - Pillar I (minimum capital requirements)
    - Definition
    - Business line mapping
    - Classification of loss event types
    - Measurement approaches (3)
    - Qualifying criteria
  - Pillar II (supervisory review)
  - Pillar III (market disclosure/discipline)
  - Quantitative Impact Study (QIS) results
Scope of Application for OR

- Primarily intended for internationally active banks and banks with significant OR exposures
- Applied, on a fully consolidated basis, at holding company and lower levels within a banking group
  - Insurance activities are excluded
- Supervisory approval required for banks to revert to simpler approach once approved for more advanced one

Pillar I – Approach 1

- Basic Indicator
  - Corresponds to the Standardized Approach for credit risk
  - Capital charge is 15% ("alpha") of bank's average annual gross income over previous 3 years
    - Gross income should exclude provisions, insurance income, realized profits/losses from sale of securities in banking book, and extraordinary or irregular items
  - No specific criteria/requirements for its use
    - Banks are encouraged to comply with Basel Committee's guidance on "Sound Practices for the Management and Supervision of Operational Risk" (February 2003)

Pillar I – Approach 2

- Standardized / Alternative Standardized
  - Bank's activities divided ("mapped") into 8 business lines
  - Capital charge is sum of specified % ("beta") of each business line's average annual gross income over previous 3 years*
  - Beta varies by business line (12% to 18% range)
  - General criteria required to qualify for its use
    - Active involvement of Board and senior management in OR management framework
    - Existence of OR management function, reporting and systems
    - Systematic tracking of OR data (including losses) by business line
    - OR processes and systems subject to validation and regular independent review by internal and external parties

* Subject to national supervisory discretion, the Alternative Standardized Approach (ASA) can be chosen. It uses volume of loans and advances (instead of gross income) as the exposure indicator for the retail and commercial banking business lines.
Pillar I – Approach 3

- Advanced Measurement Approaches (AMA)
  - Corresponds to the IRB Approach for credit risk
  - OR capital charge to be derived from bank’s own methods
  - Its use (partial or full) is subject to supervisory approval
    - The extent of partial use is determined by bank criteria and is conditional on submission of a plan to roll out AMA fully over time
    - A hybrid “allocation mechanism” approach is allowed for the calculation of OR capital for certain internationally active banking subsidiaries*
  - Broadly similar general criteria and qualitative standards as for Standardized Approach, to be met on initial and on-going basis
  - Additional quantitative standards
    - Soundness standard: selected approach must capture “tail” loss events (i.e. 1-year holding period and 99.9% confidence interval)

* “Examples for the formal loss recognition of AMA operational risk capital”, Basel Committee on Banking Supervision (January 2004).

Pillar I – Approach 3 (cont.)

- Additional quantitative standards (cont.)
  - Regulatory capital requirement for OR is the sum of EL and UL*
  - Sound, internally determined OR loss correlations can be used
  - Internal and relevant external loss data, scenario analysis, and business environment and internal control factors should be used
  - Minimum 5-year observation period for internal loss data**
  - Criteria for internal loss event capture (e.g. threshold levels, mapping by business line and event type***, recoveries, attribution etc.)
  - Credit losses from OR to be recorded but excluded from calculations

- Risk mitigation
  - Risk mitigating impact of insurance limited to 20% of capital charge
  - Various compliance criteria for risk mitigation recognition

* “Under the advanced measurement approach it is not subject to applying EAD, or an internal loss given default** (annex 3, AMR, Final Consultations Report on The New Basel Capital Accord, Basel Committee on Banking Supervision, April 2003).
** “When the bank first moves to the AMA, a three-year historical data window is acceptable*** (section 632, ibid).
*** See Appendix C of Basel II’s proposed loss event type classification.
Alternative AMA Approaches

- Given embryonic state of OR measurement, Basel II lets "a thousand flowers bloom" in the AMA
- (At least) three types of approaches identified
  - Internal Measurement Approaches (IMA)
    - PD/EAD/LGD-type framework, where capital charge (UL) is a fixed function "gamma" (calculated by bank itself) of EL
  - Loss Distribution Approaches (LDA)
    - Capital from modeling loss frequency and severity distributions
  - Scorecard approaches
    - "Base level" top-down OR capital is allocated to business lines based on risk profile and control environment indicators
- This does not preclude the use of a combination of the above approaches, or indeed others

AMA ‘Toolkit’

- Internal loss event data
- External loss data
- Scalars / Exposure Indicators
- Scenario analyses
- Key Risk/Performance Indicators (KRIss/KPIss)
  - Quantitative measures serving as early warning indicators
- Control and Risk Self Assessments (CRSAs)
  - Qualitative assessments of inherent risks and controls
- Others, e.g. external environmental assessments, audit scores, management strategic plans etc.

AMA – Some Practical Issues

<table>
<thead>
<tr>
<th>Topic</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal loss event data</td>
<td>• Selecting minimum materiality threshold</td>
</tr>
<tr>
<td>data collection</td>
<td>• Determining frequency and severity of loss events</td>
</tr>
<tr>
<td></td>
<td>• Mapping to supervisory event types/business lines</td>
</tr>
<tr>
<td></td>
<td>• Identifying and leveraging existing historical loss databases</td>
</tr>
<tr>
<td></td>
<td>• Establishing an automated process of collection, validation,</td>
</tr>
<tr>
<td></td>
<td>attribution and reporting that aligns with incentives</td>
</tr>
<tr>
<td></td>
<td>• Setting the boundary between OR and other risk types</td>
</tr>
<tr>
<td>Scorecard development</td>
<td>• Adjusting scores to make them objective and consistent</td>
</tr>
<tr>
<td>Capital modeling</td>
<td>• Using scenarios, external loss data, assumptions and data</td>
</tr>
<tr>
<td></td>
<td>extrapolation techniques to derive loss distribution</td>
</tr>
<tr>
<td></td>
<td>• Incorporating insurance and correlations</td>
</tr>
<tr>
<td></td>
<td>• Determining granularity of modeling by line/event type</td>
</tr>
</tbody>
</table>
Example: Internal Loss Capture

- Internal (people, processes or systems) or external event
- Classification (e.g. Basel’s Level 1, 2 and 3 event type categories)
- Description of loss (e.g. cash shortage)
- Detection of loss event (e.g. reconciliation)
- Description of corrective process (e.g. account edits)
- Monetary loss type* (e.g. write-down, restitution etc.)
- Determination of source of loss event (upstream)
- Loss event capture and reporting to relevant parties

*See Appendix for monetary loss type classifications.

Example: Loss Modeling

- Populating the loss distribution for a specific business line and event type

<table>
<thead>
<tr>
<th>EVENT TYPES</th>
<th>LOSS DISTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Type</td>
<td>Frequency</td>
</tr>
<tr>
<td>A</td>
<td>e.g. routine error</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>e.g. branch robbery</td>
</tr>
<tr>
<td>C</td>
<td>e.g. 9/11</td>
</tr>
<tr>
<td>High Severity</td>
<td></td>
</tr>
<tr>
<td>Low Severity</td>
<td></td>
</tr>
</tbody>
</table>

Pillars II and III

- Pillar II
  - The four key principles mentioned also apply for OR
  - 2003 paper on ‘Sound Practices for the Management and Supervision of OR’ to form basis for Pillar 2 evaluation
- Pillar III
  - Qualitative disclosures
    - OR capital approach including AMA description (if applicable)
    - Various OR management objectives and policies
  - Quantitative disclosures
    - OR capital charge at the top consolidated level of banking group
    - For banks using the AMA, OR charge before and after the reduction in capital from the use of insurance
QIS OR Results

- QIS OR results are broadly consistent with the Committee’s objectives
  - New OR capital requirement outweighs reduced credit risk capital requirements, so overall change is a small increase
  - OR constitutes 8%–15% of existing (Basel I) capital requirements, depending on selected group of business lines
  - Much greater variation of OR results within each group
  - Sizable increase in capital requirements for specialized banks
  - Optional Alternative Standardized approach preferable for banks with high margins (e.g., retail lenders)

- Loss Data Collection Exercise results indicate data availability issues for many business line/event type combinations
  - See next page

Note: Totals may not add up because no business line/event type information was provided for a few loss events and amounts.

QIS OR Results (cont.)*

<table>
<thead>
<tr>
<th>BUSINESS TYPE</th>
<th>INTERNAL</th>
<th>PERSONNEL</th>
<th>SUPPLIERS</th>
<th>CUSTOMERS</th>
<th>DELIVERY</th>
<th>PHYSICAL</th>
<th>BUSINESS DISRUPTION AND SYSTEM FAILURES</th>
<th>FORCED DELIVERY AND PRESENT MENT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Finance</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.03%</td>
<td>0.04%</td>
<td>0.05%</td>
<td>0.06%</td>
<td>0.07%</td>
<td>0.08%</td>
</tr>
<tr>
<td>Trading and Sales</td>
<td>0.09%</td>
<td>0.10%</td>
<td>0.11%</td>
<td>0.12%</td>
<td>0.13%</td>
<td>0.14%</td>
<td>0.15%</td>
<td>0.16%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Retail Banking</td>
<td>0.21%</td>
<td>0.22%</td>
<td>0.23%</td>
<td>0.24%</td>
<td>0.25%</td>
<td>0.26%</td>
<td>0.27%</td>
<td>0.28%</td>
<td>0.29%</td>
</tr>
<tr>
<td>Commercial Banking</td>
<td>0.30%</td>
<td>0.31%</td>
<td>0.32%</td>
<td>0.33%</td>
<td>0.34%</td>
<td>0.35%</td>
<td>0.36%</td>
<td>0.37%</td>
<td>0.38%</td>
</tr>
<tr>
<td>Investor Services</td>
<td>0.39%</td>
<td>0.40%</td>
<td>0.41%</td>
<td>0.42%</td>
<td>0.43%</td>
<td>0.44%</td>
<td>0.45%</td>
<td>0.46%</td>
<td>0.47%</td>
</tr>
<tr>
<td>Agency and Custody Services</td>
<td>0.48%</td>
<td>0.49%</td>
<td>0.50%</td>
<td>0.51%</td>
<td>0.52%</td>
<td>0.53%</td>
<td>0.54%</td>
<td>0.55%</td>
<td>0.56%</td>
</tr>
<tr>
<td>Asset Management</td>
<td>0.57%</td>
<td>0.58%</td>
<td>0.59%</td>
<td>0.60%</td>
<td>0.61%</td>
<td>0.62%</td>
<td>0.63%</td>
<td>0.64%</td>
<td>0.65%</td>
</tr>
<tr>
<td>Trading</td>
<td>0.66%</td>
<td>0.67%</td>
<td>0.68%</td>
<td>0.69%</td>
<td>0.70%</td>
<td>0.71%</td>
<td>0.72%</td>
<td>0.73%</td>
<td>0.74%</td>
</tr>
<tr>
<td>Total</td>
<td>0.75%</td>
<td>0.76%</td>
<td>0.77%</td>
<td>0.78%</td>
<td>0.79%</td>
<td>0.80%</td>
<td>0.81%</td>
<td>0.82%</td>
<td>0.83%</td>
</tr>
</tbody>
</table>

* Sample of 49 banks, €7.265 loss events, and €7.8 billion in OR-related losses reported in the 2002 Loss Data Collection Exercise for Operational Risk: Summary of the Data Collected (Risk Management Group, Basel Committee on Banking Supervision, May 2003).

OR Management Framework*

- Board of Directors to provide guidelines, approve and periodically review OR management framework
- OR management to translate framework into specific policies, procedures and systems
- Establishment of independent OR management function
- OR identification based on process/activity maps, and loss data collection
- Development of forward looking early warning indicators
- OR quantification, based on data sources and scenario analysis
- Validation and back testing of results
- Control and mitigation
  - Internal control policies, processes, procedures and systems
  - Incorporation of OR into credit and business applications

* Sample of 49 banks, €7.265 loss events, and €7.8 billion in OR-related losses reported in the 2002 Loss Data Collection Exercise for Operational Risk: Summary of the Data Collected (Risk Management Group, Basel Committee on Banking Supervision, May 2003).
Example: OR Control and Mitigation

- OR control and mitigation measures
  - Aimed at both center and tail of OR loss distribution
  - Can be both preventive (ex ante) and mitigating (ex post)
  - Increasingly based on cost-benefit analysis
- There exists a variety of alternative measures
  - Operational excellence initiatives, e.g., six-sigma, TQM etc.
  - Service Level Agreements with vendors/service providers
  - Contingency planning and disaster recovery
  - Capital
  - Risk transfer
    - Insurance, e.g., blanket bond, D&O liability, contingent capital etc.
    - Capital markets, e.g., cat bonds, weather derivatives

Evaluation of Basel OR Framework

- Pros
  - Forces banks to focus on growing OR issue
  - Encourages industry efforts for pooling of loss data etc.
  - Allows AMA flexibility and offers simple alternative for smaller banks
- Cons
  - Weak risk sensitivity of non-AMA approaches
  - Arbitrary rules for Basic and Standardized Approaches
    - One-size-fits-all exposure indicators and alpha/beta factors
    - Ad hoc cap on mitigation from insurance
  - High compliance costs vs. unproven business benefits for AMA
    - Relatively few perceived incentives for banks to move to AMA
    - "An exercise in capital allocation and loss data gathering?***
  - Unclear OR loss classifications and AMA methodologies

* Taken from sub-title of "Bank Operational Risk Management" (Moody's, June 2002).

Likely Impact of OR Capital Charge

- Calibrated to produce minimal change at system level
- Some redistribution of capital requirements towards banks with large specialized processing businesses
  - Examples: brokerage, custody and asset management
  - May incentivize some of these institutions to de-bank
- Smaller domestic banks will opt for the Basic or Standardized/Alternative Standardized approach
- Avoidance of AMA is not an option for most large, internationally active banks
  - A few large domestic banks may ‘opt in’ for reputational and rating considerations
Implications for Emerging Markets

- Similar themes to Basel II's credit risk framework
  - OR framework should not be examined in isolation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of application</td>
<td>• Is AMA adoption a realistic prospect?</td>
</tr>
<tr>
<td></td>
<td>• Will Basel II apply on a fully consolidated basis at group level?</td>
</tr>
<tr>
<td>Calibration</td>
<td>• Aren't the current alpha and beta factors calibrated too high?</td>
</tr>
<tr>
<td></td>
<td>• Will the capital charges encourage foreign banks to move out?</td>
</tr>
<tr>
<td>Home-host recognition</td>
<td>• How do you ensure coordination in cross-border supervision?</td>
</tr>
<tr>
<td></td>
<td>• How to level playing field between domestic and foreign banks?</td>
</tr>
<tr>
<td>Transition to Basel II</td>
<td>• Isn't adherence to Basel Core Principles a necessary precondition?</td>
</tr>
<tr>
<td></td>
<td>• Shouldn't customization be based on national circumstances (bank</td>
</tr>
<tr>
<td></td>
<td>capabilities and supervisory preparedness) and priorities?</td>
</tr>
<tr>
<td></td>
<td>• Isn't a longer/more flexible timeframe required?</td>
</tr>
</tbody>
</table>

Conclusions

- Basel II has made OR a distinct and important discipline in its own right
- Industry-wide convergence to OR standards will continue to evolve for the foreseeable future
  - Loss definitional issues, data collection techniques and quantification methodologies still under discussion
- No one right answer on how to proceed
  - Approach based on strategic priorities, organizational culture, practical (cost-benefit) considerations and market/regulatory developments

Appendix
### Classification of Loss Events

<table>
<thead>
<tr>
<th>EVENT/TYPE</th>
<th>CATEGORY (LEVEL 1)</th>
<th>DEFINITION</th>
<th>CATEGORIES (LEVEL 2)</th>
<th>ACTIVITY EXAMPLES (LEVEL 3)</th>
</tr>
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<td>Theft/Robbery</td>
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<tr>
<td>Systems Security</td>
<td>Theft of Information (w/monetary loss)</td>
<td>Theft and Fraud</td>
<td>Theft/Robbery</td>
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<td>Product Flaws</td>
<td>Misappropriation of Assets</td>
<td>Losses due to acts of a type intended to defraud, misappropriate property or resources on behalf of the party, which involves a third party</td>
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<td>Theft/Robbery</td>
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<td>Advisory Activities</td>
<td>Disputes Over Performance of Advisory Activities</td>
<td>Losses due to acts of a type intended to circumvent the law, by a third party</td>
<td>Systems Security</td>
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</thead>
<tbody>
<tr>
<td>Employee Relations</td>
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</tbody>
</table>
## Monetary Loss Types

<table>
<thead>
<tr>
<th>Loss Type</th>
<th>Causes</th>
<th>Monetary Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal and Liability</td>
<td>Lost legal suit</td>
<td>External legal and other indirect costs in response to an operational risk event</td>
</tr>
<tr>
<td>Regulatory, Compliance and Taxation</td>
<td>Legal and other proceedings, external legal and other related costs</td>
<td>Due to the dismantlement of any other provision, such as licence revocation, associated costs (including loss of licence revenue)</td>
</tr>
<tr>
<td>Loss or Damage to Assets</td>
<td>Accident, negligence, fire, earthquake</td>
<td>Declaration of the value of the firm’s non-financial assets and property</td>
</tr>
<tr>
<td>Restitution</td>
<td>Interest claims</td>
<td>Payments to third parties for principal and/or interest or the cost of any liability of compensation paid to clients and/or third parties</td>
</tr>
<tr>
<td>Cost of Rare Events</td>
<td>Additional efforts to enforce a legal claim on an addressee for the recovery of assets due to an operational error</td>
<td>Payments made to incorrect parties and/or incorrect orders, including losses arising from incomplete registration of collateral and including in excluded positions</td>
</tr>
<tr>
<td>Write Down</td>
<td>Fraud, mis-represented market and/or credit risks</td>
<td>Direct reduction in value of financial assets as a result of operational errors</td>
</tr>
</tbody>
</table>