Implementing an AMA for Operational Risk

Perspectives on the ‘Use Test’

Joseph A. Sabatini
Agenda

- Overview of JPMC’s AMA Framework
- Description of JPMC’s Capital Model
- Applying Use Test Criteria for Banks and Regulators
- Closing Comments

Appendix: JPMC Capital Model Detail
The objective of the op risk framework at JPMC is improving financial performance.

The JPMC Operational Risk framework combines quantitative and qualitative elements for effective risk management.

The framework is:
- Business-oriented
- Risk-specific
- Firm-wide
- Driven by value proposition

Operational risk system:
- Owned by businesses
- Consistent, firm-wide roll out
- Validated by Audit
- Compatible with Credit / Market risk tools

Implementation:
- Project teams for each initiative
- Audit sign off required for key elements
- Redundancies eliminated

Key Risk Indicators (in design)

Business Units

Self Assessment
Risk Event Error Reporting
Governance Framework
Operational Risk Capital Allocation
Integrated Reporting / Best Practices
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Appendix: JPMC Capital Model Detail
Basel II - The Advanced Measurement Approach

- “Under the AMA framework, a banking organization meeting the AMA supervisory standards would use its internal operational risk measurement system to calculate its regulatory requirement for operational risk.”

- “While the supervisory standards are rigorous, institutions have substantial flexibility in terms of how they satisfy the standards in practice. This flexibility is intended to encourage an institution to adopt a system that is unique to its risk profile, foster improved risk management, and allow for future innovation.”
Basel II - The Advanced Measurement Approach (cont’d)

➢ “The (AMA-qualified) institution would have to use a combination of ….
   - Internal loss event data
   - Relevant external loss event data
   - Business environment and internal control factors
   - Scenario analysis
     …. in calculating its operational risk exposure.”

➢ An institution’s analytical framework would have to combine these elements in the manner that most effectively enables it to quantify its operational risk exposure …. 
     …. appropriate to its business model and risk profile.
Economic capital model for op risk at JPMC

PRINCIPLES UNDERLYING THE MODEL:

- Risk-based calculation, based on operational data
- Directionally correct, progressive and repeatable
- Incentives for good risk management behavior
- Consistent with credit, market and business risk capital
- Consistent with the Advanced Measurement Approach under Basel II

BUSINESSES CAN INFLUENCE CAPITAL BY:

- Reducing Losses
- Improving the quality of controls
- Transferring financial risk

Calculation of capital is a four step process:

1. Calculate Base Capital (Enterprise Level)
2. Allocate to Business Units (LOB)
3. Adjust for Control Quality Changes
4. Adjust for Risk Transfer

INPUTS:

- Loss data from the Corporate Risk Event Database
- Scenario forecast of future losses

Key Risk Indicators:

- Metric: Change in SA score
  - Impact: Reduction or Increase
- Metric: Change in Audit grade
  - Impact: Reduction or Increase
- Metric: Actual vs. Plan dates
  - Impact: Increase only

Control Self Assessment Score → Audit Grade → Action Plan Execution → Key Risk Indicators

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Appendix: JPMC Capital Model Detail
Applying Use Test criteria for banks and regulators

### Banks

#### Conclusion

#### Danger Signs

#### Key Elements

#### Principles
- Data integrity: complete, timely and accurate
- Efficacy of calibration
- Appropriate governance at all organization levels
- Transparency and escalation of key issues and information

### Regulators

#### Conclusion

#### Danger Signs

#### Key Elements

#### Principles
- Rigorous standards maintained
- Flexible (non-prescriptive) approach
- Consistent application across banks and national jurisdictions
- Accommodate innovation
### Use Test Criteria: Principles

*Both banks and regulators should be guided by key principles*

<table>
<thead>
<tr>
<th>Banks</th>
<th>Regulators</th>
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<tbody>
<tr>
<td>Ø Data integrity: complete, timely and accurate</td>
<td>Ø Rigorous standards maintained</td>
</tr>
<tr>
<td>Ø Efficacy of calibration</td>
<td>Ø Flexible (non-prescriptive) approach</td>
</tr>
<tr>
<td>Ø Appropriate governance at all organization levels</td>
<td>Ø Consistent application across banks and jurisdictions</td>
</tr>
<tr>
<td>Ø Transparency and escalation of key issues and information</td>
<td>Ø Accommodate innovation</td>
</tr>
<tr>
<td>Ø Clear accountability in remediation</td>
<td>Ø Mandate ongoing improvement</td>
</tr>
<tr>
<td>Ø Integrated into business and risk management</td>
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**Banks**
- Rigorous standards maintained
- Flexible (non-prescriptive) approach
- Consistent application across banks and jurisdictions
- Accommodate innovation
- Mandate ongoing improvement
## Use Test Criteria: Key Elements

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<thead>
<tr>
<th>Banks</th>
<th>Regulators</th>
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</thead>
<tbody>
<tr>
<td>- Policies and governance forums</td>
<td>- In depth understanding of bank’s business and risk profile</td>
</tr>
<tr>
<td>- Loss data, internal &amp; external</td>
<td>- Established standards communicated in advance</td>
</tr>
<tr>
<td>- Scenarios</td>
<td>- Facilitate creative dialogue</td>
</tr>
<tr>
<td>- Control environment measures</td>
<td>- Focus on improving risk management</td>
</tr>
<tr>
<td>- Others: Audit results, KRI’s, etc</td>
<td></td>
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<tr>
<td>- Reporting</td>
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## Use Test Criteria: Danger Signs

<table>
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<th>Banks</th>
<th>Regulators</th>
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</thead>
<tbody>
<tr>
<td>Ø Weak data integrity</td>
<td>Ø Fixed expectations</td>
</tr>
<tr>
<td>Ø Inadequate transparency and escalation</td>
<td>Ø Inconsistent standards</td>
</tr>
<tr>
<td>Ø Uninformed / unengaged business managers</td>
<td>Ø Inconsistent application</td>
</tr>
<tr>
<td>Ø Lack of integration or linkage into business performance measures</td>
<td>Ø Prescriptive requirements</td>
</tr>
<tr>
<td>Ø Unnatural limitations on effort</td>
<td>Ø Emphasis of form over substance</td>
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</table>
Use Test Criteria: Conclusion

<table>
<thead>
<tr>
<th>Banks</th>
<th>Regulators</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Enormous progress and momentum</td>
<td>- Share the burden for success</td>
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<tr>
<td>- Challenges remain</td>
<td>- Behavior will drive banks to:</td>
</tr>
<tr>
<td>- Compliance vs. risk management</td>
<td>- improved risk management</td>
</tr>
<tr>
<td>- Avoid rationalizing short comings</td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>- compliance role</td>
</tr>
<tr>
<td></td>
<td>- Focus needs to be validation of integrity</td>
</tr>
<tr>
<td></td>
<td>rather than prescriptive remediation</td>
</tr>
</tbody>
</table>
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JPMC Operational Risk Economic Capital Model
Operational Risk is an integrated component of the firm’s overall capital framework

Success drivers:
+ risk based
+ forward looking
+ owned by businesses
+ imbedded incentives
+ assigned accountability
+ integrated with governance

Symptoms of failure:
- residual capital
- assigning blame
- overly complex
- inconsistent with other risks
- owned by staff function
- regulatory focus only
Economic capital model for op risk at JPMC

PRINCIPLES UNDERLYING THE MODEL:
- Risk-based calculation, based on operational data
- Directionally correct, progressive and repeatable
- Incentives for good risk management behavior
- Consistent with credit, market and business risk capital
- Consistent with the Advanced Measurement Approach under Basel II

BUSINESSES CAN INFLUENCE CAPITAL BY:
- Reducing Losses
- Improving the quality of controls
- Transferring financial risk

Calculation of capital is a four step process:
1. Calculate Base Capital (Enterprise Level)
   INPUTS:
   - Loss data from the Corporate Risk Event Database
   - Scenario forecast of future losses
2. Allocate to Business Units (LOB)
   Simple algorithm based on scenario models
3. Adjust for Control Quality Changes
   Inputs from other components of the framework
4. Adjust for Risk Transfer
   Placeholder for future implementation

Key Risk Indicators
- Control Self Assessment Score
  Metric: Change in SA score
  Impact: Reduction or Increase
- Audit Grade
  Metric: Change in Audit grade
  Impact: Reduction or Increase
- Action Plan Execution
  Metric: Actual vs. Plan dates
  Impact: Increase only
- Key Risk Indicators
  Metric: Change in KRI scores
  Impact: Reduction or Increase

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We firstly calculate a “base capital” number by combining loss data and scenario forecasts of loss

1. Losses > $20,000 from 1/1/2002 to the current period
2. Future loss scenario forecasts, including stress events, by line of business and risk category
3. The statistical engine combines frequency and severity distributions derived separately from the data and scenarios in a Monte Carlo simulator
4. The base capital number represents the unexpected loss portion of the total Operational Value-at-Risk

Step 1: Calculate Capital
We have a limited time series of complete, quality data

- Complete, quality data across all business lines captured since 1/1/2002 is used for modeling.
- Data exists for a number of businesses prior to that date but is no longer relevant to the current organization.
- Anecdotal data going back over 10 years exists for large losses.
- The short time series of data used for modeling results in volatile capital from quarter-to-quarter.
Severity and frequency distributions are generated from the loss data for each business line.

**Severity of Loss**

- Theoretical distributions are fitted to the empirical data using a statistical fitting technique called Maximum Likelihood Estimation.
- “Best-Fit” distribution is selected based on statistical tests which calculate the maximum difference between the theoretical distribution and the empirical data.

**Event Frequency**

- Annual frequency of event determined using historical event occurrence, taking into account business changes, adjustment for trends.
- Absent additional information, frequency is assumed to follow a Poisson distribution, standard in the industry used to model randomly distributed events.
Scenario analysis - definition

- Systematic process of obtaining expert opinions, from business managers and risk management experts
- Derive reasoned assessments of likelihood and impact of plausible operational losses, consistent with the regulatory soundness standard
- May rely to a large extent on internal or, especially, external data
- Particularly useful where internal or external data do not generate a sufficient assessment of the institution’s operational risk profile
Scenario analysis - JPMC implementation

1. Typical teams consisted of:
   - Business managers
   - Operations managers
   - Risk managers
   - CFOs
   - Legal
   - Internal audit
   Other specialists included:
   - Compliance
   - Technology
   - Information security

2. More than one meeting was normally held to develop and review the scenarios

3. Scenario data and modeled results were compared across businesses

4. Scenarios will be updated annually and when material changes to the business occur

Loss scenarios were generated by teams from 20 businesses
Scenario analysis - JPMC implementation (cont’d)

The target output of the scenario analysis process was a complete loss profile for a given business, by major risk category, that could be modeled.

1. **Major event risk categories**
   (we use 5 major categories internally that map - via Level 2 - to the industry/regulator standard 7 categories)

2. **Frequency by $ range**

3. **Maximum potential loss from a single event**

4. **Description of stress events**

<table>
<thead>
<tr>
<th>Business Unit</th>
<th>Event Type</th>
<th>ABC Business</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>EXECUTION, DELIVERY &amp; PROCESS MANAGEMENT</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|               | Transaction Capture, Execution & Maintenance | 220 | 60 | 6 | 0.5 | 0 | 50 | 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Distributions are created from the "buckets" of frequency and severity.

**Severity of Loss**
- Theoretical distributions are "fitted" to the empirical scenario using statistical techniques.
- The distribution which best describes the scenario is selected for modeling.

**Event Frequency**
- Annual average frequency obtained directly from the scenario.
- Absent additional information, frequency is assumed to follow the Poisson distribution, a standard in the industry used to model randomly distributed events.
Next the distributions are combined

**Data**
- Internal Losses

**Scenarios**
- Internal Losses (including anecdotal data)
- External Losses: Peer Group Data
- Business Profile and External Environment

**Monte Carlo Simulator**
- Scenario Workshops
- Forecast Loss Profiles

**Base Capital**

**CALCULATION:**
- One year holding period
- 99.97% Confidence Interval
- Capital excludes EL
- Distributions:
  - Poisson (frequency)
  - Lognormal
  - Fat-Tail Lognormal
  - Transformed Beta
The loss data and scenario distributions are combined in a Monte Carlo simulation.

Confidence in data in this range high – use data curve 100%

Initially, confidence in data over $1mm is low. Weight Data 20%, Scenarios 80%

Over time, increase $1mm threshold
And increase weight of data relative to scenarios
In Step 2 the base capital is allocated to each major business line

1. Base capital is calculated at the enterprise level

Example:

- Treasury & Securities Services
  - Institutional Trust Services
  - Investor Services
  - Treasury Services
- Card Services
- Retail Financial Services
- Investment Bank
- Asset & Wealth Management
- Commercial Banking

2. The combined amount is allocated down to LOBs, based on the relative percentages of the scenario-based capital
Qualitative factors - challenges

- Selecting and calibrating the metrics
  - Determining what metrics are appropriate
  - Determining the “slope-of-the-line” for each metric
  - Determining the relationship between individual metrics (e.g. RCSA, Audit grades)

- Correlating the benefits / penalties with results, over time
The allocated base capital is adjusted in Step 3 for each line of business to reflect changes in the quality of the control environment.

- **Allocated Base Capital**
- **Control Self-Assessment Score**
- **Audit Grade**
- **Action Plan Execution**
- **Key Risk Indicators**
- **Adjusted Capital**

**Metric:** Change in CSA score  
**Impact:** Reduction or Increase

**Metric:** Change in Audit grade  
**Impact:** Reduction or Increase

**Metric:** Actual vs. Plan dates  
**Impact:** Increase only

**Metric:** Change in KRI scores  
**Impact:** Reduction or Increase

Audit provides the checks and balances to validate the integrity of the adjustment metrics.
Validation - definition

- “An institution has to test and verify the accuracy and appropriateness of the operational risk framework and results”
- “An institution has to periodically compare its assessment of these (internal control) factors with actual operational loss experience”
- “An institution’s operational risk framework has to include...independent testing and verification”
Validation - JPMC implementation

The availability of comparable benchmarks today is limited. Our validation is based, for now, on a series of reasonability checks.

1. Internal data
   - Comparison of scenario forecasts vs. internal and external loss data
   - Trends in losses vs. trends in control quality metrics

2. Internal ratios
   - Comparison of capital levels by line of business
   - Ratio of actual losses to capital
   - Ratio of theoretical mean-to-VaR
   - Theoretical mean vs. observed loss levels
   - Ratio of op risk capital vs. total economic capital

3. External data
   - Commercial database
   - ORX

4. Internal Audit
   - Model
   - Business Data Quality
Validation - JPMC implementation example

The importance of scenarios in the model demands particular scrutiny of forecasts vs. experience over time

1. Absolute frequency of losses
   Q: Do the scenario frequency projections match our internal annualized loss experience, particularly at the tail?
   A: Over $1mm the scenario frequency is greater than the actual loss experience

2. Distribution of losses (shape of the loss curve)
   Q: Does the distribution of losses in the scenarios match the actual loss experience?
   A: The data curve has a more volatile profile

3. Maximum Loss
   Q: How do maximum loss data, internal or external, influence scenario model inputs?
   A: Loss experience should very strongly guide, but not dictate, scenario model inputs

Loss Distribution Curve - Actual results vs. forecast

Scenarios
Loss Data
The scenario analysis model lends itself to assessing the impact of potential changes in the risk profile.

The frequency and severity factors can be changed and remodeled with ease, to assess changes in the risk profile:
- *By risk type*
- *By business*

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<th>To</th>
<th>#</th>
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<td>1,000,000,000</td>
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**Examples:**
- What if the probability of a $10mm event doubles?
- What if the maximum loss increases from $100mm to $200mm?
- What if the frequency of losses less than $100,000 increases by 50%?
- What would the impact be if the loss just experienced at XYZ Bank happened here?