

Industry Position Paper

I. Scenario Analysis - Perspectives & Principles

Introduction

This paper on Scenario Analysis (SA) (Part I – Perspectives and Principles) is one in a series of industry position papers by the AMA Group¹ on business practices affecting the implementation of Advanced Measurement Approaches (AMA) in the United States. It is intended to aid in a continued dialogue between the industry and the regulatory community on this aspect of AMA implementation.

While the AMA Group (AMAG) has observed signs of convergence on certain aspects of Scenario Analysis², the Group believes that the regulatory community should continue to take a principles-based, as opposed to a prescriptive, approach to the use of Scenario Analysis by institutions in order to encourage use of Scenario Analysis as both a capital estimation and a risk management tool.

AMAG Perspectives

Scenario Analysis is one of four elements identified in Basel II, Pillar 1 that AMA institutions must consider in estimating their minimum capital requirement for operational risk. The other three are internal loss data, external loss data and business environment and internal control factors (BEICF). The U.S. Rule for Risk Based Capital Standards: Advanced Capital Adequacy Framework, published in the Federal Register on December 7, 2007, defines scenario analysis as “a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood and loss impact of plausible high-severity operational losses.” The most recent Interagency Guidance released on June 3, 2011 reiterates this definition. The Basel Framework contains similar language, but does not contain an explicit definition of scenario analysis.

Scenario Analysis has proven to be a key tool in the identification and management of operational risk. During the past ten years the financial services industry has witnessed numerous tail events that have resulted in enormous financial loss and reputation damage. An industry consensus has evolved towards the importance of Scenario Analysis and the ways it can be used effectively to support the risk

¹ The Advanced Measurement Approaches Group (AMAG) was formed in 2005 to share industry views on aspects of Advanced Measurement Approaches (AMA) implementation with the U.S. financial services federal regulatory agencies. The members of AMAG are listed in Attachment B to this Paper. They are listed for identification purposes only. Support for the AMAG is provided by RMA and Operational Risk Advisors LLC (ORA). This Paper does not necessarily represent the views of RMA's institutional membership at large, ORA, or the views of the individual institutions whose staff have participated in the AMAG.

² The AMA Group has observed convergence through its 2010 and 2011 survey work in terms of scope, output and refresh frequency, but notes that there is a range of practice in respect of as either direct or indirect inputs, the number of scenarios developed annually and the use of workshops for scenario development.

management process. Many managers now embrace scenario analysis as an activity that is vital to running their businesses.

Despite the emerging recognition of its value, Scenario Analysis is proving to be one of the most challenging aspects of AMA. For instance, a considerably wide range and diversity of practice and opinion continues to exist with respect to its use in risk measurement. This may be a reflection of the fact that no single accepted conceptual or technical practice has emerged for incorporating Scenario Analysis into operational risk measurement. In addition, regulatory guidance in this area has shifted over time, continues to evolve, and is considerably different across national jurisdictions, which presents a challenge to internationally active banks.

Combine this with inconsistent messages received across the industry from the regulatory community about the impact on capital -- some have seemed to imply that a bank's SA can only increase its capital; others have given the sense that it may be used to either raise or lower capital -- and the divergence is understandable. In the short term, a formula for the application that satisfies both the industry and U.S. regulatory community seems somewhat elusive.

Industry Practices: AMAG Range of Practice (ROP) surveys of members during 2010 and 2011 indicate some convergences in aspects of the use of Scenario Analysis in recent years, but continued value-added experimentation, as well. Although the industry is consistent in its view that SA is a very useful AMA element, there is no unanimity about how it should be applied in all cases.

Industry Positions:

Scenario Analysis Principles

Position I.1 --

Scenario Analysis is developing as a very important and valuable tool for the management and measurement of operational risk.

The industry has reached substantial agreement on the value realized from the use of Scenario Analysis as a risk management tool. Many managers now embrace the process in preparing their businesses for unexpected events as evidenced by a variety of scenario exercises that inform capital and risk response applications.

As a forward-looking element it can assist in the identification of key risk exposures and potentially severe events (especially emerging risks) with a potential for material capital impact. In several aspects it transcends the other three elements of AMA. For one, when conducted in an open and creative environment, scenario development can unlock insights about events admittedly possible, but not realized before by a given institution. It can serve as a means to explore potential extreme events, as well as potential correlated and cumulative impacts, thereby helping to populate data sets that are otherwise lacking.

Scenario exercises can also be a highly effective way to engage senior/executive management in the operational risk management process. At a high level it can both spark ideas and serve as a platform to opine on, document and track risk response, mitigation and control efforts. When engaged at a unit or team level, it can also enhance product and service delivery processes, and/or inform risk pricing

decisions. In addition, institutions have realized benefits when scenario analysis is both a process performed on a regular basis and when conducted *ad hoc* to target specific topics or concerns. Beyond the AMA elements, it provides logical support for stress testing and ICAAP, as well.

Regulators should consider emphasizing the design and execution of these applications, along with their benefits, in both implementation and regulatory reviews.

Position 1.2 --

An effective Scenario Analysis process must be tailored to a financial institution's business structure, risk appetite, culture, and risk management framework.

The industry and regulators alike have recognized that a well-functioning financial system requires that banks take prudent risk positions that generate an appropriate level of earnings. An institution's risk level should be informed by its risk appetite. As the industry recovers from the economic crisis, institutions must focus on their risk tolerances so that they become a part of the bank's culture. It should not be surprising to see a wide range of scenario analysis practices given the range of business models, strategies, locations, management styles, corporate cultures, and risk frameworks. One might argue that there may be as many different effective applications of scenario analysis as there are different combinations of those variables.

Institutions must be free to design their scenario analysis process to work effectively within an institution's unique structure and framework. If a particular formula for conducting rigid scenario exercises and applying the results is forced upon an institution and its culture, business units will likely resist, and ultimately depreciate its value by relegating the process to those outside of the realm of decision making.

In contrast, where linked to embedded features, such as risk-based methodologies and culture, scenario analysis can provide an important forward-looking assessment. Business leaders would have an incentive and the opportunity to focus on high-impact risk issues that can affect their risk-based capital. When fully engaged, leaders have made improvements in their control environment in the interest of risk mitigation and/or to create more effective processes.

Position 1.3 --

To be credible the Scenario Analysis process must meet standards and rigor commensurate with its use.

Industry participants agree that any viable (or effective) scenario analysis process must be grounded in principles and an acceptable level of rigor. Institutions must be free to develop processes that have a level of consistency and repeatability at a given institution. They need to address potential biases that might occur in the process and/or workshops, and validation needs to be performed by the corporate operational risk group or another party. There appear to be few differences of opinion between industry participants and the regulatory community on these points or on adherence to required regulatory standards.

One possible difference worthy of note, however, may be the detailed application of those principles. In particular, the implication is that rigor is defined as a single set of standards and controls on the process

irrespective of its use. Instead, the determination of an acceptable level of rigor should be made by each institution as a function of its SA application. That is, the standards for uses that have a direct impact on capital would be different from those that guide the use for more generalized risk management, including the identification of control weaknesses, risk mitigation enhancements, and the like.

Position I.4 --

Financial institutions must have *flexibility* to use Scenario Analysis in a manner that produces maximum cost effective risk management and measurement benefits.

In view of current and evolving practice, and to assure maximum benefit, it is important that banks be allowed flexibility in their use of SA to supplement operational risk processes, systems and models, as needed. Banks should have the flexibility to design, conduct and apply the scenario analysis process in the manner which is most useful to manage risk in individual institutions.

Some institutions may elect to use the Scenario Analysis process primarily as a risk management tool. This should be acceptable subject to an institution's own internal practices in demonstrating and documenting the rationale and risk management value obtained from the exercise. Others may elect to use the process primarily as a risk measurement tool, whether directly, or indirectly as a validation tool. This should also be acceptable provided the institution can demonstrate adequate rigor, repeatability, manage bias, and justify and document the methodology for using scenarios as such. Still others may elect to use the process for both purposes, subject to the qualifiers outlined here and in Position I.3, above.

The selected application and approach for each institution will depend upon its business model, organizational structure, operational risk framework, and how scenario analysis compliments the use of other operational risk tools. Flexibility should be allowed to conduct the process in a manner that best allows an institution to obtain maximum risk management benefit from the process. This is consistent with the industry and regulatory community's mutual goal of assuring a safe, sound and well-capitalized financial system.

Position I.5 --

Challenges persist in implementing Scenario Analysis, but should diminish in time given broad application and continued experimentation.

The industry and regulators alike have encountered or observed a variety of challenges in using Scenario Analysis, most notably when applied in risk measurement. These have ranged from the difficulties of assigning relative probabilities to extreme tail events as opposed to more likely large loss events, assigning frequency measures to scenarios, and determining correlation between and among scenarios.

Elsewhere, challenges persist in the very process of conducting scenario exercises. Naturally, some participants fall victim to psychological biases such as overconfidence, motivational and availability biases, partition dependence, anchoring and bandwagon effects. In addition, although the process might draw enthusiastic participants during an initial cycle, recreating that enthusiasm during repeat sessions to revisit or address similar circumstances may not garner the same level of enthusiasm.

Differing regulatory treatment among international jurisdictions has presented yet another dimension of challenge for large AMA institutions operating and competing in numerous countries.

AMAG benchmarking surveys indicate, however, that experimentation has resulted in advancement and risk management value on a firm-by-firm basis, and that further progress is likely.

Position 1.6 --

It would be premature to force a convergence of Scenario Analysis practices at this time.

AMA firms have been working over the past several years to settle on the application of SA that yields the most effective risk management information value that, in turn, informs capital estimates. In some cases the information and data needs for risk management and capital, respectively, have yielded entirely different approaches.

Some industry participants, and presumably the regulatory community as well, are becoming concerned with the lack of clear progress toward agreement on acceptable uses of scenario analysis for capital. As such, there may be a temptation to move toward narrowing the field of application to a shorter list of 'safe' choices. For instance, the industry appreciates U.S. regulators' reluctance to accept certain uses of SA from a pure quantitative view; however there is a sense that an opportunity to improve the state of risk *measurement* may be missed if this option is marginalized to the point of elimination. Some may argue that the use of scenario data as a direct input to the modeling process provides the beneficial forward-looking perspective of possible loss scenarios that have not occurred, or have at least not been captured in loss databases, instead capturing only the retrospective view of known losses from internal and external loss data.

Similarly, it should be an objective to define the parameters of more generalized risk *management* applications of scenario analysis broadly enough to encourage creative thought, and hold the attention and enthusiasm of business leaders and staff participants. Many AMA institutions have now invested years and significant resources in the development of programs and applications that have won enthusiasm from those leaders and staff, and are already producing improvements in risk management

Flexibility to date in both risk management and risk measurement applications has resulted in a range of practices that, in the industry's view, are viable, effective and should be accepted by regulators. For the foreseeable future, industry participants and regulators should both continue to encourage development of practices in scenario analysis. In view of the challenges and evolving thinking on the subject, both communities should come together to work towards the identification of workable and acceptable applications. The AMAG believes that an open dialogue with the U.S. Interagency Basel Qualification Team (BQT) could yield further mutual understanding and progress.

[Note: AMAG is exploring the prospect of a second paper on Scenario Analysis (i.e., "Part II") that will provide greater detail on effective Practices.]

Attachment A

Scenario Analysis Regulation in the U.S.

The U.S. Rule

Excerpts from the Final U.S. Rule for Risk Based Capital Standards: Advanced Capital Adequacy Framework (Published in the Federal Register, December 7, 2007)

- “Scenario analysis means a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood and loss impact of plausible high-severity operational losses. Scenario analysis may include the well-reasoned evaluation and use of external operational loss event data, adjusted as appropriate to ensure relevance to a [bank]’s operational risk profile and control structure.” (p. 491)
- “Scenario analysis. The [bank] must have a systematic process for determining its methodologies for incorporating scenario analysis into its operational risk data and assessment systems.” (p. 511)

U.S. Interagency Guidance

Section on Scenario Analysis from the 2011 U.S. Guidance on The Advanced Measurement Approaches for Operational Risk (June 3, 2011)

“Scenario analysis under the advanced approaches rule is a systematic process of obtaining expert opinions from business managers and risk-management experts to derive reasoned assessments of the likelihood and loss impact of plausible, high-severity operational losses. Scenario analysis may include the well-reasoned evaluation and use of external operational loss event data adjusted, as appropriate, to ensure relevance to a bank’s operational-risk profile and control structure. Scenario analysis provides a forward-looking view of operational risk that complements historical internal and external data. The scenario analysis process and its output are key risk-management tools that are especially relevant for assessing potential risks to which the bank may be exposed.

“Scenarios are typically developed through workshops that produce multiple scenarios at both the line of business and enterprise levels. Scenario development exercises allow subject matter experts to identify potential operational events and their impacts. Such exercises allow those experts to better prepare to identify and manage the risk exposures through business decisions, risk mitigation efforts, and capital planning. Inclusion of scenario data with other data elements in internal risk-management reporting can support development of a comprehensive operational risk profile of the bank.

“There are significant challenges with the development of scenario analysis. Some of these challenges include mitigation of bias and justification for loss frequency and severity estimates. Sound scenario analysis development and output depend on the skill and expertise of facilitators and participants. By its nature, scenario analysis typically includes some degree of bias and subjectivity. Biases in scenario analysis development processes can include overconfidence, motivational bias, availability bias, partition dependence, and anchoring.

“ Scenario analysis should be governed by a consistent process to ensure the integrity of the estimates produced. A sound scenario process should be clearly defined, repeatable, and transparent. It should be responsive to changes in both the internal and external environment. The process should involve appropriate representation of the business lines and subject matter experts, with oversight by the ORMF. Participants should be trained in the scenario generation process, and should receive relevant and detailed background information (including internal and external loss data) that is derived through a systematic selection process.

“Given the subjective nature of scenario analysis, banks should implement mechanisms for identifying and mitigating biases inherent in scenario development processes. Such mechanisms include carefully structured questions, a well-defined decision-making process, and consideration of a range of possible loss frequencies and severities. Scenario estimates should be supported by high-quality documentation of the reasoning and the rationale underlying the estimates. In addition, banks should implement a robust independent challenge process to ensure that key risks have been captured and scenario estimates are appropriate and well-supported. Banks also should have a process to evaluate and improve upon the results of past scenario workshops.

“There are significant challenges in using scenario analysis data as a direct input to the modeling process given the subjective nature of scenario analysis data. For example, it is difficult to mix synthetic (scenario) data and observational (internal and external) data elements in a credible manner. Supervisors will closely scrutinize a bank’s approach to mixing internal and scenario data at the observation level, and will review statistical evidence confirming that such an approach is valid. In addition, to address the inherent subjectivity involved in scenario analysis development, banks should have sufficiently transparent processes that explain the judgments used in the development and weighting of scenario analysis data. A bank may consider indirect methods for the use of scenario analysis in its operational-risk quantification systems, including using scenario analysis to develop benchmark models or to adjust operational risk exposure estimates as described below.

Scenario Analysis as a Benchmark

“In a scenario benchmark model, scenario analysis data are used as a direct input into a model that is separate from the primary (base) operational-risk quantification model (such as a model based on internal and/or external data). The outcome of the benchmark model may result in an adjustment to the operational-risk exposure estimate generated by the base model. When scenarios are used for benchmarking, it is critical to demonstrate the credibility of the benchmark model through validation and appropriate documentation. In addition, the bank should be able to show that: (i) scenario output can be credibly and transparently translated into an estimate of operational-risk exposure for the bank’s units of measure; and (ii) for a given UOM, the risk exposure can be appropriately estimated using internal and relevant external data.

“The method chosen for comparing the results from the benchmark scenario model with those of a base model should incorporate a range of possible outcomes, such as the calculation of a confidence interval around the point estimate of the base model. While values that lie in the confidence interval may differ numerically from the point estimate, those differences may be small enough that they do not provide convincing evidence of an inaccurate point estimate.

“Thus, scenario analysis may be used either to select a different outcome from within this range or, more generally, to select among candidate distributions (or models) that reasonably fit a given collection of data and therefore are considered statistically indistinguishable and equally valid.

“When using scenario analysis as a benchmark, there are two possible results:

- i. A scenario benchmark result that falls within the confidence interval generated by the base model generally would not be viewed as statistically different from the base model and the estimate of operational risk exposure would equal the output of the benchmark model. Supervisory scrutiny would increase as the benchmark result moves toward the limits of the confidence interval or as the confidence level increases (for example, a 95 percent versus a 90 percent confidence interval).
- ii. A scenario benchmark result that falls outside of the confidence interval should prompt the bank to thoroughly investigate the credibility of the results of both the base model and the benchmark model. The investigation may conclude that the base model and/or benchmark model are flawed and a correction to one or both of the models is warranted. A bank’s process for modifying the model(s) to address deficiencies must be credible, transparent, systematic, and verifiable in accordance with the requirements of the advanced approaches rule.

“If the review and investigation of the base model and the scenario analysis benchmark model indicates that the methodologies of both appear sound but a discrepancy between the outcomes persists, then the bank should consider alternative means for incorporating scenario analysis into its operational-risk quantification process. For example, a bank may consider using scenario analysis data to adjust its operational-risk exposure estimates. However, supervisors expect significant support and documentation for this approach. Such a qualitatively based adjustment to the results of the base model may be appropriate in limited instances (e.g., if internal and external data do not provide a sufficient number of relevant large loss results). When using a scenario-based adjustment, banks should provide the rationale for adjusting their exposure estimate as well as evidence that:

- i. The methodology is credible, transparent, systematic, and verifiable;
- ii. Adjustments to quantified exposure estimates are subject to an independent review and approval process that confirms whether key judgments and any resulting changes to exposure estimates are credible; and
- iii. The original model and its outcomes are statistically sound prior to any adjustment and the size of the adjustment is appropriate.

“The agencies recognize that, in principle, a credible process could produce both upward and downward qualitative adjustments. A qualitative reduction in exposure estimates may be acceptable only in extremely limited circumstances. As such, a downward adjustment generally is not consistent with a conservative risk assessment. As with upward adjustments, a bank should provide the rationale for a downward adjustment and ensure that the adjustment meets the three criteria above. Furthermore, the magnitude of any adjustment to the quantitatively estimated operational-risk exposure should always be governed and justified by policy thresholds that conform to conservative risk assumptions.

Scenario Analysis as the Base Model

“In rare cases, a bank may have insufficient internal data and relevant external data to derive an operational-risk exposure estimate for a UOM. Provided that the bank has documented and demonstrated that insufficient data exist, a bank may consider using a scenario-based approach. In this approach the other three data elements must be inputs into the scenario analysis process. However, the bank also should continue its efforts to collect internal and external data in order to address the paucity of data.”

The Basel Accord

International Convergence of Capital Measurement And Capital Standards: A Revised Framework

Updated November 2005

Scenario analysis

675. A bank must use scenario analysis of expert opinion in conjunction with external data to evaluate its exposure to high-severity events. This approach draws on the knowledge of experienced business managers and risk management experts to derive reasoned assessments of plausible severe losses. For instance, these expert assessments could be expressed as parameters of an assumed statistical loss distribution. In addition, scenario analysis should be used to assess the impact of deviations from the correlation assumptions embedded in the bank’s operational risk measurement framework, in particular, to evaluate potential losses arising from multiple simultaneous operational risk loss events. Over time, such assessments need to be validated and re-assessed through comparison to actual loss experience to ensure their reasonableness.

Attachment B

About the AMA Group

The Advanced Measurement Approaches Group (AMAG) was formed in 2005 by the Risk Management Association (RMA) at the suggestion of the U.S. AMA-BQT (formerly the Inter-Agency Working Group on Operational Risk). The RMA is a member-driven professional association whose purpose is to advance the use of sound risk management principles in the financial services industry.

The purpose of the AMAG is to share industry views on aspects of Advanced Measurement Approaches (AMA) implementation with the U.S. financial services federal regulatory agencies. The Group consists of operational risk management professionals working at financial service organizations throughout the United States. The AMAG is open to any financial institution regulated in the United States that is either mandated, opting in, or considering opting in to AMA. A senior officer responsible for operational risk management serves as the primary representative of each member institution on the AMAG. Of the twenty or so US financial service institutions that are currently viewed as mandatory or opt-in AMA institutions; eighteen were members of the AMAG at the time of this writing.

The members of AMAG are listed below. They are provided for identification purposes only. This paper does not necessarily represent the views of RMA's institutional membership at large, or the views of the individual institutions whose staff have participated in the AMAG.

Bank of America / Merrill Lynch
BMO Financial
BNY Mellon
Capital One Bank
Citizens Bank
Deutsche Bank
Goldman Sachs
HSBC
JP Morgan Chase
Keycorp
Morgan Stanley
Northern Trust
PNC
State Street
SunTrust
TD Bank Financial Group
Union Bank of California
Wells Fargo / Wachovia Bank

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