JOINT RISK MANAGEMENT SECTION

Canadian Institute of Actuaries
Casualty Actuarial Society
Society of Actuaries

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Risk management

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Risk management

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This newsletter is free to section members. Current issues are available on the SOA website (www.soa.org).

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ARTICLES NEEDED FOR RISK MANAGEMENT

Your help and participation is needed and welcomed. All articles will include a byline to give you full credit for your effort. If you would like to submit an article, please contact Ross Bowen, editor, at *Ross.Bowen@allianzlife.com.*

The next issues of *Risk Management* will be published:

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PREFERRED FORMAT

In order to efficiently handle articles, please use the following format when submitting articles:

- Word document
- Article length 500-2,000 words
- Author photo (quality must be 300 DPI)
- Name, title, company, city, state and email
- One pull quote (sentence/fragment) for every 500 words
- Times New Roman, 10-point
- Original PowerPoint or Excel files for complex exhibits

If you must submit articles in another manner, please call Kathryn Baker, 847.706.3501, at the Society of Actuaries for help.

Please send an electronic copy of the article to:

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Letter from the Editors

By Ross Bowen and Pierre Tournier

IN THIS EDITION OF *RISK MANAGEMENT* we're covering a wide variety of topics. To me, this shows as risk managers all the things we need to keep in mind on a daily basis! We are also proud to present the winners of the most recent call for papers, "Risk Metrics for Decision Making and ORSA." All essays are available online and will be distributed to members in print as well.

The winners are:

First Place: "Understand ORSA Before Implementing It" by Anthony Shapella and Owen Stein.

Second Place: "Effective Resilience and Interdisciplinary Approaches to Risk" by Rick Gorvett

Third Place: "Focusing on Own Risk of the ORSA Process" by Max J. Rudolph

Here's a quick preview of what you can find in this issue.

RISK IDENTIFICATION

In "Business-Focused Risk Maps: An Approach to Improve the Effectiveness of Risk Identification," Karen DeToro and Jeremy Smith outline a process for building a risk map. In this process, risk maps are built in collaboration with the business side before moving on to risk quantification and management. This groundwork can improve collaboration with the lines of business, strengthen the ERM program, and drive a deeper understanding of the business for all participants.

"Focusing on Own Risk of the ORSA Process" by Max Rudolph reviews the strengths and weaknesses of ORSA and the models that support it. The author stresses that understanding inputs and models is important in getting value out of the risk management process.

RISK QUANTIFICATION

"From Liquidity Crisis to Correlation Crisis, and the Need for 'Quanls' in ERM" by Stéphane Loisel looks at the correlation crisis that followed the liquidity crisis in 2008. This paper argues for a focus on dynamic correlations to better understand and model the impacts crises have on correlations. The author discusses the difficulties in successfully incorporating correlation crises and some key steps to take to move toward a better framework.

"Investment Management in a Risk Management Context" by Robert Berendsen and Steven Chen discusses portfolio performance measurement as it relates to liability benchmarks. The authors show that a liability driven benchmark helps measure the value of investment decisions. The article also touches on other benefits of liability benchmarks, particularly in helping the manager understand asset performance.

"Effective Resilience and Interdisciplinary Approaches to Risk" by Rick Gorvett discusses how to effectively compare risks in a multidisciplinary context. The author considers "effective resilience," a metric that incorporates both adverse events and management responses. By including both the event and recovery period, this metric tries to capture the true impact an event will have on the company.

RISK RESPONSE

"Liquidity Risk in an Insurance Operation" by Derek Newton, David Sanders, and Gary Wells discusses the need for a direct treatment of liquidity risk. The authors argue for integrating liquidity risk into the overall framework by highlighting past liquidity events that led to insolvency. They show that a traditional liquidity management philosophy may not adequately protect an insurer against a liquidity event.

RISK CULTURE AND DISCLOSURES

"Understand ORSA Before Implementing It" by Anthony Shapella and Owen Stein explains the purpose of ORSA as well as practical considerations that go with it. The paper describes how an effective ORSA program should manifest itself as an ongoing process with qualitative outputs.

CONTINUED ON **PAGE 4**

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Letter from the Editors | from Page 3

"Towards a Risk Management Profession" by Dave Ingram is an overview describing the evolution role of actuaries in risk management. In response to evolving regulation and desired skill sets, the actuarial profession is adapting to meet these demands. Because of the CERA track and the developing professional standards of practice, the author argues that the actuaries are well placed to be leaders in the industry.

"A Friendly Conversation: Emerging Markets—Enterprise Risk Management within the Banking Industry" by Jawwad Farid is a thoughtful overview of risk management practices in emerging markets. The article covers some of the issues unique to these markets as well as how risk management is regarded in general. The author also touches on the key steps to successfully introducing an ERM practice into an emerging market bank.

I would also like to take this opportunity to encourage our readers to contribute to the section by writing an article. We are always interested in increasing our contributor base and getting new ideas out there. Both traditional and nontraditional subjects are welcome. We're also interested in book reviews or synopsis of seminars or other meetings. There are other ways to get involved if you are interested; see below for one such project from the SOA ERM Exam Committee.

The SOA ERM Exam Committee is looking for volunteers to help educate the next generation of actuaries that are specializing in the ERM field and seeking the CERA designation. You, as members of the Joint Risk Management Section, are uniquely qualified via your experience and interest to assist in this objective. In addition to your philanthropic contribution to the profession and the inherent networking opportunity, time spent researching exam material counts toward SOA CPD credit.

Our primary needs are in question writing and development. We're also looking for help in enhancing our newly created Case Study, which is used as the basis for a portion of our exam questions. The ERM Exam encompasses six distinct tracks and we are interested in volunteers of any background; however, we are particularly short of volunteers in the retirement, health and P&C tracks.

The qualified volunteer should be dedicated to completing his or her assigned task within the target deadlines. We prefer the volunteer to commit to volunteering for multiple exam sessions, such that we may maintain committee continuity and groom these volunteers for future leadership roles within our committee. The exam committee and the SOA can provide the training and guidance necessary to writing quality questions.

To express your interest in helping out, or if you have any questions, please contact Sean Conrad at *sean.conrad@hlamerica.com* or 704-731-6382. ■

The Role of the Actuary in Risk Oversight

By Stuart Wason

MY WORK AS AN ACTUARY FOR CANADA'S FEDERAL REGULATOR OF FINANCIAL INSTITUTIONS (OSFI) has recently been focused on a more formal assessment of the actuarial function of insurers. The lessons learned from this work may be of interest to many members of this section as they relate to the role of the actuary in providing risk oversight.

RELIANCE VS. USE

OSFI's risk-based supervisory framework was amended in 2011 to add the "actuarial function" (AF) to the list of insurer independent oversight functions (i.e., along with internal audit, compliance, risk management) which are important in the mitigation of an insurer's inherent risk. This change reflects a continuation of the shift from "reliance" to "use" of the work of the actuary by OSFI. This is in line with the importance placed on the work of the actuary by regulators and the attendant need for independent oversight.

Actuaries are employed in a variety of roles in insurers due to their education, skills, experience and professionalism (e.g., pricing, product design, underwriting, claims management, investment, financial reporting, capital management, executive positions, etc.). The scope of an AF assessment may vary for each insurer but clearly, most actuarial roles are important to the ultimate protection of policyholders.

The assessment of the AF attempts to validate important aspects of the actuary's work so that OSFI can have confidence in using the work of the actuary. To be clear, under normal circumstances, this shift is not intended to replace the work of the company actuary (e.g., full modeling, data validation, recalculation, assumption setting, etc.).

Assessing the AF seeks to measure the key qualitative and quantitative aspects of, and outputs from, the actuarial function throughout the insurer/group (as appropriate) and between companies. While the regulator will not be resourced to verify all such qualitative and quantitative outputs, it will seek to determine the reasonableness, consistency and comparability of material outputs, with emphasis on those related to key risks.

The complexity, size and nature of the risks assumed by insurers have highlighted the need for insurers, and the actuaries who play key roles within them, to demonstrate sound practices in risk governance and management. Therefore, OSFI expects active involvement in risk management to be a key component of the actuarial function.

INDEPENDENT OVERSIGHT

The need for independent oversight functions is well known. However, individual insurers will adopt different approaches taking into account the nature, scope, complexity and risk profile of their operations. For larger, more complex insurers/groups/financial institutions, fully independent risk management functions, internal audit and compliance functions are expected. For smaller institutions, it would be useful to focus on the principles of independence, rather than the structure, to maximize functional independence. For example, do the control function personnel have clear performance objectives/incentives that link to the management of risk rather than targets related to profit, revenues and volume? Is their incentive compensation calculated independently of the results of the business unit they oversee?

Boards and management should do more than rely on "gut and instinct" when assessing management. "Gut and instinct" are good things, reflective of the degree of experience and judgement of those performing such assessment.

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However, arranging for third-party reviews from time to time of the financial institution's oversight functions will help boards and management (not to mention the regulator) to benchmark the institution's risk management practices and processes.

Given the importance of the work of actuaries in insurers, it seems only fitting that the AF provide independent risk oversight within the insurer. However, in practice, the answer may vary substantially from insurer to insurer. In some insurers the scope of the AF itself may not be well defined and the connections between areas such as product pricing, ALM, financial reporting and risk management may not be clear. In some insurers it may be difficult to define the head of

CONTINUED ON **PAGE 6**

The Role of the Actuary in Risk Oversight | from Page 5

the AF. Even if the head of the AF is well defined, to what extent does that person provide independent risk oversight? Is their role also combined somehow with an operational role? For example, it is difficult to provide independent risk oversight to a hedging program if the individual is also responsible for its design and operation.

Work of the external auditor and peer review processes help to provide independent reviews of parts of the actuarial function and confirm its reliability but they may not be comprehensive enough for the regulator. Some examples might include:

- While the external auditor performs some recomputation of actuarial outputs, independent oversight of actuarial results is important given their complexity and significance to an insurer
- Increasing use of sophisticated internal models warrants independent oversight of their design, calibration and use
- The need to demonstrate effective linkage between activities such as pricing, ALM, valuation, capital models, etc.

In the event (hopefully rare) that the AF of an insurer is not seen to provide sufficient independent risk oversight, the onus falls to the other insurer oversight functions to assume those duties.

Does your AF provide sufficient independent risk oversight? ■

Business-Focused Risk Maps: An Approach to Improve the Effectiveness of Risk Identification

By Karen J. DeToro and Jeremy Smith

IN RECENT YEARS, many insurers have sought to initiate an Enterprise Risk Management (ERM) program or strengthen their existing programs. In one form or another, ERM programs include a risk identification process. Companies often perform some sort of risk identification exercise early in the development of their program, and conduct periodic "refresher" exercises on an ongoing basis. In the past, this exercise has sometimes been more informal, with companies focusing on risks that are "top of mind" for the senior management team. However, the risk in this approach is that the results may be colored by the recency effect and other biases, which limit the universe of risks that a company might consider. To address this risk, companies are seeking broader approaches to risk identification. Though every company does this somewhat differently, one tool that seems effective in helping companies to develop a broader view of their risks is a risk map. Rather than being a static reference tool, risk maps can be used as a fundamental and dynamic part of the risk identification process.

BEFORE THE MAPPING: THE IMPORTANCE OF PLANNING AND STAKEHOLDER MANAGEMENT

Unfortunately, many companies dive into their risk identification exercise without sufficient preparation. For example, the company may create a risk register template, send it out to each department and ask for it to be filled out by a certain date. Very often, the output is too varied and complex. Risk identification should be conducted in live, interactive sessions rather than using this type of survey approach. Moreover, companies should be strategizing and planning for their risk identification exercises *well in advance,* thinking carefully about exactly who should attend the sessions, how to communicate with these individuals (both before and after the session) what materials will be used, what information will be collected and in what format, along with many other important considerations beyond the scope of this short article.

Stakeholder management is critical in the early planning stages. Put simply, people are more likely to support the risk map if they perceive that they influenced its development. It is very likely that the eventual users of the risk map will feel that they already manage risk on a daily basis and have significant experience in this area. They may resist anything that resembles a lecture in how to do their job, particularly from an outsider from another department. Soliciting stakeholder feedback early in the process can accomplish several goals:

- The feedback will likely provide an indication of whether the individual stakeholder is a supporter, a resister, or a passive participant in the overall risk identification exercise;
- Stakeholders feel that their opinion counts and develop a sense of ownership in the final product;
- Stakeholder feedback actually *is* essential in developing a useful risk map!

RISK MAPS: DEFINITION AND PURPOSE

Risk maps classify the company's risks into various categories and levels. A typical example might have three levels. Level 1 would consist of broad risk categories that affect most companies such as Strategic Risk, Operational Risk and Financial Risk. Level 1 might also include risk categories specific to a particular industry, such as Insurance Risk. The Level 2 risks would be slightly more granular, with categories such as Reputation (under Strategic Risk), Fraud (under Operational Risk). For Insurance Risk, Underwriting Risk might be an appropriate Level 2 category. The map can include as many levels as needed to properly capture the company's risk universe. However, there are practical considerations as discussed below.

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Usually the Level 1 and Level 2 categories are defined by a small working group based on prior risk events, the experience of the chief risk officer or ERM function, or (in the worst case) reasoning in a vacuum. The core group usually confers with subject matter special-

CONTINUED ON **PAGE 8**

Business-Focused Risk Maps | from Page 7

ists to populate Level 3 and beyond. The result is a risk map that conforms to a *risk manager's* sense of risk, rather than a business user's sense.

A risk map should be a starting point for a discussion about risk and a facilitating tool for identifying risks that are not "top of mind." It should not, at first, be expected to necessarily capture all risks and classify them in exactly the right place. In fact, excessively complicated risk maps may invite controversy, leading to unnecessary distractions. It is not uncommon for different people to disagree on how the map should be structured or how risks should be classified (e.g., consider whether reserving risk for a life insurer be classified as "insurance risk" or "operational risk." Would your colleagues agree with you?). The more complex the risk map, the more time will be spent moderating unproductive debates about its structure and content. A deep understanding of the company's risks is an *output* of the risk identification process, not an input. Therefore it should be clear that the risk map is a working document at this stage. It's better to invest time having a thoughtful and lively discussion about the company's exposure to risk as opposed to debating the structure of the risk map.

RISK MAPS: SELECTING AN APPROPRIATE FRAMEWORK

As a way to avoid some of the traps that can occur when starting with a blank sheet of paper, a company may develop the corporate risk map around a framework established by an authoritative third party, such as the company's rating agency. Companies tend to be sensitive to their rating agency's perceptions and expectations. While some participants may be initially skeptical about the value of the risk identification exercise (or ERM in general, for that matter) everyone should acknowledge the clear benefits of improved standings with the rating agency.

Depending on the context, different rating agency frameworks may be employed. A life insurance company rated by Moody's may wish to review *Moody's Global Rating Methodology for Life Insurers* and construct a risk map around that methodology. Both Moody's and S&P also provide ratings specific to companies' ERM capabilities. Companies who view a positive ERM rating as a market differentiator may wish to build their map accordingly. Regardless of the specific selection, it is critical to maintain a clear connection to the company's business drivers. At first blush, a risk manager may feel that the frameworks mentioned above do not lend themselves to risk maps in a natural way. But it's important to build the risk map around the business drivers, not the other way around.

While translating a rating agency framework into a risk map can be very effective, other approaches can also work well. For example, a generalized risk map published by a third party can be adapted to the company's particular situation. Our U.S. firms utilize a "Risk Intelligence Map" as an objective framework for discussing risk. At its highest level, this map organizes risks into six broad categories:

- Governance
- Strategic Risk
- Financial Risk
- Insurance Risk
- Operational Risk
- Regulatory and Compliance Risk

To construct a risk map, the six broad categories above could be used as Level 1 categories, and relevant subcategories could be used as Level 2 risks. As an example, a Level 2 risk category under Governance might be "Board Structure," which in turn would include several Level 3 risks such as "Fiduciary Duty," "Effectiveness of Subcommittees," "Strategy/Execution Alignment," and so forth.

We have found that a risk map constructed in this way has several advantages:

- **Less churn:** Devising a risk taxonomy from scratch can be a very time-consuming process and fraught with angst, because reasonable people have valid disagreements about the most appropriate way to classify risk. Using an objective framework, on the other hand, keeps the focus on risk identification rather than risk categorization. As illustrated above, an objective framework does not necessarily have to be generic. For example, the Moody's framework is highly specific and relevant to life insurers.

- **Business focus:** Some of the displayed categories will be familiar to any risk manager (e.g., brand, capital adequacy, liquidity), but others are seen less frequently (e.g., market position, financial flexibility). This is because risk managers tend to work backwards from the risks to the business impact. That is, they will consider a variety of risks that implicitly affect the company's market position or financial flexibility, rather than beginning with the business consideration and drilling down to the associated risks. By demonstrating a concern for the company's business needs, the risk manager can show that he is willing to meet the business leaders on their turf rather than forcing them to speak his language.

- **Risk Metrics:** Occasionally companies invest a great deal of time formulating a desired set of risk metrics, only to find they lack the necessary data to calculate them, or they lack the resources to do so on a regular basis. Even when the metrics are feasible to calculate, they often lack a clear relationship to profitability. The Moody's rating guide, for example, provides numerous illustrative metrics that are considered in the rating process, and it is highly likely that a company rated by Moody's is already routinely monitoring these metrics. Corporate ERM can use these same risk metrics directly, or leverage the underlying data to derive additional metrics. More generally, practical risk metrics tend to be more readily available when a risk map well-aligned with a company's business processes and value drivers.

- **Rating Agency Relationship:** There are benefits to using a framework that is already familiar to a company's rating agency. First, it should be somewhat easier to discuss that framework with the agency during an ERM review. Second, the agency should readily agree that the framework is broadly aligned with the company's business drivers, at least at the Level 1 and Level 2 dimension.

USING THE RISK MAP TO DRIVE A DEEPER UNDERSTANDING OF THE BUSINESS

Risk maps are customarily used as a reference tool, akin to an encyclopedia or blueprint of the company's risk exposures. A risk, once identified, will be compared against the map to determine that it is filed correctly within the risk register. However, risk maps can be used in a much more focused and active way. They can play an integral role in the risk identification process, particularly when leveraged in a workshop environment with a properly equipped facilitator.
A high level approach to conducting a risk identification exercise is described below, using the risk map as a key component. Note that there are many considerations involved in facilitating a workshop such as this. This article does not attempt to list them all, but provides a sketch of the overall process and highlights the role of the risk map.

First, an objective taxonomy should be selected, such as one based on a rating agency, as described above. Level 1 and Level 2 categories are based largely on the published rating methodology, with some deviations as needed based on the company's specific situation. Level 3 categories are pre-populated with *suggested* areas for further discussion by the management team.

Next, a risk identification workshop should be convened consisting of selected functional and business unit leaders from across the organization. It is important that key leaders attend the workshop rather than delegating this responsibility. At the workshop, a large poster-sized copy of the risk map can be prominently displayed and introduced as a tool to guide the discussion. If the appropriate advance work has been performed, the risk map should clearly show a close relationship to the company's business drivers. A relatively free-ranging discussion is preferred, but a work-

CONTINUED ON **PAGE 10**

Business-Focused Risk Maps | from Page 9

shop facilitator can help keep the discussion on track. The facilitator should ask the participants to freely discuss the different risk categories and brainstorm specific risk events that could occur, without regard as to whether they can be easily quantified. Effective facilitators typically come prepared with a large "question bank" designed to revive the conversation in the event of a lull. (Examples: "What are our hedging objectives? Are we achieving those objectives? What could cause our hedging to become ineffective?")

The results of the discussion should be captured in a risk register. This information can then be used as the starting point for a risk quantification exercise. Compiling a risk register in a live workshop setting is a technique in itself, and outside the scope of this article. It suffices to say that careful planning is recommended, well in advance, because risk identification workshops tend to be highly dynamic and critical information can be easily lost.

The process described above is quite different from what many companies typically do. Usually, different departments are asked to identify a set of risks in each category. In other words, risks are identified in silos. This is ironic, because it is commonplace nowadays to decry the folly of *managing* risks in silos; yet *identifying* them in this manner is not viewed as problematic. By discussing risks as an departmental management team, unforeseen relationships and correlations naturally begin to emerge. (Memorably, one manager pointed out that a natural disaster would likely increase the risk of a privacy breach, due to the need to activate emergency backup systems that may have unexpected vulnerabilities.)

It may appear that the risk map plays only a small part in the larger process described above. In fact, however, workshop participants tend to constantly refer back to the risk map as they brainstorm different scenarios. This may be due to the fact that the risk map is presented as a starting point and also visually appears as such, due to its simple design. It invites users to work with it, to elaborate on it, and to be creative. Presenting a solid, well-reasoned framework up front frees the participants to invest their creativity and brainstorming around the risks themselves, rather than the classifications. In contrast, when managers are confronted with a highly complex risk map they tend to fight it, dismiss it or shut down.

CONCLUSION

Effective risk identification requires active, thoughtful participation from the senior management of each major functional area within the company (Finance, Investments, Underwriting, Claims, etc.) These individuals should understand that they are participating in a valuable process that can help them achieve business goals. Otherwise they are likely to feel they are participating in a compliance exercise—an unwelcome distraction from their core business objectives. Based on our recent experiences with several forward-thinking clients, we see a new type of dynamic thinking beginning to emerge around risk identification within an ERM program. The monolithic, bureaucratic (and usually unsuccessful) approaches of the past are being discarded in favor of nimble, highly collaborative processes which are easy to refresh on a regular basis.

If your company has invested a great deal of time and energy into a risk identification exercise which ultimately proved unsatisfactory and did little to further the company's ERM objectives, take some comfort that you are not alone. Consider implementing a more business-focused and strategic approach. You may find that the outcome is much more successful, and also that it is easier to work out the bugs and iterate the process compared to the more traditional approach.

Finally, one word of caution is noted concerning risk categorization and risk maps. The exact categorization of the risks within the risk taxonomy should not be a primary concern during the risk identification process. For almost all companies, risk taxonomy is simply not that important at this stage of the game. Like early biologists, we should concern ourselves with identifying as many different and interesting creatures as possible and then worry about phylum, genus and species at a later time. In fact, a positive outcome of the risk identification process may be the development of an entirely new risk map for use in the next round. Such creative destruction should be embraced and encouraged. As the company's ERM program matures and risk identification becomes ingrained in the conscious-

ness of management, reliance on risk maps and similar tools will decrease. In this sense, the risk map can be seen as a ladder that we use to ascend to a new level of understanding. But the understanding is what counts, not the ladder.

ABOUT DELOITTE

Focusing on Own Risk of the ORSA Process

By Max J. Rudolph

Editor's Note: *This essay was originally published in the "Risk Metrics for Decision Making and ORSA" essay e-book and was the third prize winner in the Call for Papers. It has been reprinted here with permission.*

EFFECTIVE RISK MANAGEMENT IS NOT DRIVEN BY A REGULATORY PROCESS. In the long run the corporate culture and CEO incentive plans have much more to do with successfully traversing a long time horizon than any models. Risks tend to accumulate, especially during stable periods when many so-called experts claim it is "different this time." It never is.

So how can an insurer required to comply with an Own Risk Solvency Assessment (ORSA) regulation leverage this information and use it internally to improve the likelihood of solvency and gain a competitive advantage?

RISK CONCENTRATIONS

Becoming aware of risk concentrations is the most important concept to understand when managing risk. Risk-focused decision making is likely the largest concentration issue at many companies, where one individual uses dictatorial power to push through an agenda. Risk comes in many forms.

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Many seeking to implement ORSA have well-intentioned agendas. They are trying to do the right thing. But that, unfortunately, is not enough. Insolvencies will not be reduced through legislation. Who among the risk community feels safer now that Risk Focused Examinations are a requirement? ORSA is the start of a useful process, not the final effort. Think back to the origins of cash-flow testing requirements. The seven scenarios tested were not that useful by themselves. Once the initial models were built, a new paradigm had formed.

Modeling economic capital, for example, provides useful information during normal times but tends to be procyclical and virtually useless when the economy implodes. The missing analysis concerns the gross exposures to concentrated risk. Modeling net exposures works fine when counterparties are functioning, but insurers will not enjoy the surprise when a reinsurer or other financial counterparty becomes insolvent and exposes the tangled web of financial intermediaries. That is when the concentrated exposures to geographic location or risk become apparent.

HELPING ORSA DRIVE VALUE

So if ORSA will not meet internal needs, how can you drive the process so it adds value and allows better decisions to be made? While you must realize that models will not solve your problems, they can be very useful in helping to understand the risks that have been accepted. The risk manager must avoid using models as a black box that generates a single number. Models cannot optimize a block of business, but they can provide information about how a new block will integrate with an existing one if you understand their assumptions and value drivers. Optimization routines are generally based on the benefits of diversification, using correlation matrices to combine multiple risks. Correlations are based on recent historical data, and do not go back far enough to include previous hard times. Think of the different decisions that would have been made if housing market data had included information from the Great Depression of the 1930s, or if payout annuity pricing factored in the 1918 influenza pandemic. When we model future interest rates, no one considers data from the Weimar Republic's hyperinflationary period. Why not? Hyperinflation does not seem all that remote right now.

Data is never complete, and correlations constantly change. Many of the metrics required by the Basel Accords did not include data going back 10 years, so banks made decisions assuming risk interactions would remain consistent with those from a period of relative peace and prosperity. The time horizon tested under ORSA has long been a bone of contention. In reality, it doesn't matter. No matter what time horizon you choose, the data will underestimate the likelihood of default (kudos to Nassim Taleb for making so much money from this revelation). Data collected in recent periods ignores future risks we have not considered, as well as the inevitable but ignored asteroid, super volcano and war. To argue about the probability of insolvency in the next year is preposterous. Defaults cluster, and if you go far enough into the tail, all firms are subject to creative destruction. To say that every firm should be capitalized so only one out of 200 will

"Those who choose the path of least resistance - maintaining harmony and not making waves - will, in the long run, destroy value."

fail in any year (99.5 percent) is ridiculous and should satisfy no one.

Realistic stress-testing is the best way to test for solvency risk. Unfortunately, most CEOs prefer to be wrong with the herd rather than alone when managing risks. No one was ever fired for not seeing the approaching "perfect storm." Regulatory-driven stress tests tend also to be impacted by politicians. The initial European bank stress tests had no component for a sovereign debt crisis, even though one was already under way. They did not want to "scare the markets." Does anyone test their CEO's strategic plan for ineptitude? I didn't think so.

Understanding gross exposures, where your counterparties (e.g., reinsurers or swap counterparties) go under, or when a 10-day rainstorm hits California, should be the norm. An insurer should know before the fact what their exposure is to a strong storm or earthquake hitting San Francisco, Tulsa or Charlotte. Building and maintaining this database may be the most useful thing a risk team can accomplish, because it helps the firm better understand its risk profile and prioritize its decision making.

Current best practice says that risks should be aligned with the firm's risk appetite, but companies discovered in 2008 that their risk appetite is not stable. In the good times, boards become much more likely to approve the risky new opportunity. Models thrive during these periods, purporting to optimize results. But they are using data from the tail, from the portion of the distribution where extreme positive results occur. Qualitative assessment and contrarian thought can provide a competitive advantage. "This time it's different!" becomes the mantra in the press. But it's not different, and when instability returns, risk appetite goes down. Warren Buffett has said, "Be greedy when others are fearful, and fearful when others are greedy." CEOs and risk managers would do well to hang this on the wall of their office.

It's not what the regulators ask for that is important; it's how you leverage it to add value that makes enterprise risk management (ERM) worthwhile. It will pay for itself many times over if firms understand the benefits they receive.

BUILDING A COMPETITIVE ADVANTAGE

Risk management is no different than other business disciplines. Early adopters can enjoy an advantage, but eventually the practice becomes common and leads to concentration risk. If everyone has the same risk mitigation strategy, thinking they are the only ones employing it, then it eventually won't work. At some point there will be no one to take the other side of the bet. We have seen this in the past when hedge funds were forced to exit an asset class and found that many were following the same strategies and using the same asset classes. What seemed safe quickly morphed into heavy losses and fund closure.

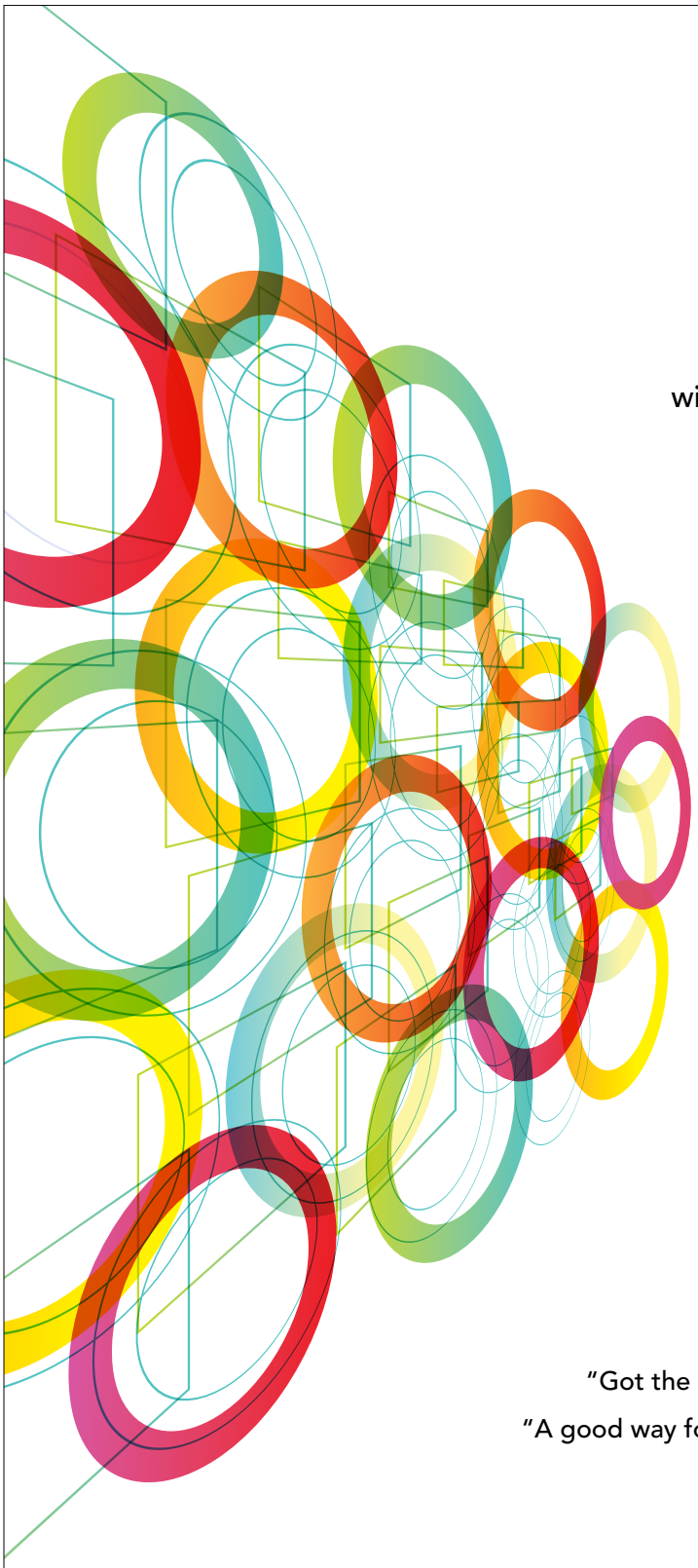
Those who choose the path of least resistance—maintaining harmony and not making waves—will, in the long run, destroy value. A healthy dialogue that encourages alternative views will bring out the best in a team, and it should not always be the same person. The key is to get these viewpoints into the mix early enough so they can be used to make better decisions.

CONTINUED ON **PAGE 14**

Focusing on Own Risk of the ORSA Process | from Page 13

SPLITTING THE JOB

ERM can turn into a bureaucracy if you are not careful. Better decisions will be made if strong employees rotate through the risk manager position and then return to line management. This will only work if the corporate culture embraces risk in a way that is driven top-down and practiced bottom-up. The ERM team will own the process, not the risks. It will communicate consistent practices and coordinate communication of risk concepts. The best location for this team will depend on the specific firm, but could include audit, finance or actuarial. Residing here will be the master list of risks and the projects to better manage them. The focus here will be on risk mitigation and managing the ERM process. The risk manager should not receive a bonus based on financial results. Incentives should be aligned with maximizing long-term value. The strategic planning area is where the chief risk and return officer will reside. This person will look at opportunities as well as mitigation efforts. The chief risk and return officer needs to be a trusted confidante of the CEO and respected by the board, knowledgeable enough to ask modelers tough questions and understand the answers. Someone who understands emerging risks and interactions between risks, has an eye for unintended consequences, and is willing to share ideas and concerns would be ideal for such a position. It sounds just like many actuaries I know. ■



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From Liquidity Crisis to Correlation Crisis, and the Need for 'Quanls' in ERM

By Stéphane Loisel

Editor's Note: this essay was originally published in the "Risk Management: The Current Financial Crisis, Lessons Learned and Future Implications" essay e-book. It has been reprinted here with permission.

THE LIQUIDITY CRISIS AND THE INSUFFICIENT DEPTH OF THE MARKET LED TO A STRONG CORRELATION CRISIS: *many risks that could be considered as close to mutually independent in the classical regime suddenly became strongly positively dependent. More correlation crises may happen in the future. We need to be more careful with black-box tools and to train what I would define as ''quanlitative analysts" ('Quanls') in the Enterprise Risk Management (ERM) process, that is risk managers who are able to lead interdisciplinary ERM studies from a jointly qualitative and quantitative point of view, with an emphasis on dynamics.*

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The recent crisis may be regarded as a result of the lack of the depth of the financial market to absorb liquidity needs after a period of artificial additional growth generated by (too) easy access to credit and (too) low interest rates. As things went wrong, many risks, often considered to be close to independent, suddenly became strongly positively dependent: this is what we define as a correlation crisis in Fisher et al. (2008) and Biard et al. (2008).

From the point of view of the insurance industry or of the equity derivatives market, the recent crisis would be a consequence of an external shock arising from the subprime crisis in credit risk. The fact that many companies defaulted or were downgraded almost simultaneously corresponds to what is often referred as a consequence of the smile of correlation: correlation has been known to be larger in bad times than in the classical regime for quite a number of years.

Nevertheless, after this exogenous risk appeared, once liquidity needs are there and as the market is not deep enough to absorb it, most market participants tend to behave similarly, breeding a vicious cycle: because of margin calls and liquidity needs, investors are forced to sell valuable (on the long term) assets at the bad instant, which leads to adverse price moves, further margin calls, and so on… This copycat behavior generates and amplifies risk within the market and as such is an example of endogenous risk, in analogy with the horizontal oscillations of the Millennium Bridge of London that forced the bridge to close for a battery of tests three days after its opening to the public, as noted by Danielsson and Shin (2002).

A pandemic could create a correlation crisis between insurance and financial risks. The consequences on the future earnings of insurers and the difficulties that financial institutions would have to maintain their activities are often underestimated in Solvency II and in Basel II. The way correlations are defined in QIS4 of Solvency II does not really take into account correlation crises that could occur after a catastrophe, or just because of endogenous risk, for example with surrender options. How to value these options, as well as deposits in finance, remains a question that has to be addressed in a more sophisticated way.

One often hears about the crisis that people got lost in the mathematics. I am convinced that some products were far too complex, and the models to describe their dynamics far too simple.

To me, considering more sophisticated models does not mean replacing a Brownian motion with a more general Lévy process, or a Gaussian copula with a mixture of Student copulas. I believe that we must pay more attention to the dynamics, and consider risk processes with non-stationary increments and dynamic correlation models, with the goal to understand the main sources of risk.

If a pandemic occurred, the delay between its beginning and the date at which insurers or reinsurers would have to pay, as well as the time elapsed before stock prices move back up after the epidemics, would be very important. Similarly, in the equity market, the correlation crisis that caused many basket options to be underpriced is likely to end later on almost as suddenly as it appeared, and missing this dynamic would lead to bad hedging strategies. Identifying the main sources of risk and understanding their interactions is far more difficult, but it has to be done if we want to move to Basel III and Solvency II.1, instead of moving back to Basel and Solvency 0. Both fundamental and applied research is needed to tackle these issues. With an integrated risk view and a correct ERM process, those external shocks and their endog-

"We must pay more attention to the dynamics, and consider risk processes with non-stationary increments and dynamic correlation models."

enous consequences could be studied and managed at the same time.

Important difficulties to overcome concern IT, Pillar 2 of Basel II and Solvency II and invisible barriers that make it quite difficult to implement an ERM process that guarantees this view of risk at the macro level. Very often, to meet the constraints of some softwares and to maintain robustness and auditability of processes, models are simplified, and key risks like credit risk or exchange rate risk may be ignored for some combinations of positions taken by the front office. Besides, some market participants, instead of using the official software, may take their decisions directly from self-developed programs that are black boxes at the risk management level. One must absolutely avoid blindly trusting black-box models as one trusted rating agencies to measure credit risk. In the insurance business, I am concerned by the fact that a few software developers have a monopoly on the quantification of financial consequences of natural disasters and are almost blindly trusted by many insurers and reinsurers, in spite of recent events and strange yearly price movements obtained for the same risk with the same software. Because these risks are complex and specific, it is tempting for supervisors to use this black box model as well. Similarly, in finance, some controls are made by the middle office with the front office software because it would be too expensive to develop another one. If market participants or insurers all use similar black box models, a hard correlation crisis might occur if an unmodelled catastrophe breaks out. To implement a valuable ERM process would require more transparency of models and strategies, and we get to one of the main issues to address after the crisis: how to deal with the mismatch between confidentiality and competition on one side, and the need for an ERM process, for supervision and for communication to markets (Pillar III of Basel II and Solvency II).

Fair value and risk neutral valuation techniques have also been too often blindly used without exercising critical judgment. There is currently a debate on the use of fair value and the freedom to use a different framework during a crisis. First, I think one must not mix up accounting,

regulatory and pricing tools. Second, a concept that should be useful to measure something and to take risk into account is not suitable if you can only use it when risk does not show up. Third, in contrast to some people who recommend forgetting these valuation techniques, I think they "just" need to be adapted to take into account risks of temporary illiquidity, correlation crises and copycat behavior and the way transactions are made, in particular if there are only a few market participants (in the case of insurance-linked securities, for example).

Another point to carefully address is the way brokers, traders, executives and others can maximize their salaries, and the perverse incentives this may create. The one-year horizon in Solvency II reinforces the preference for a short-term view too. It is clear that if no five- or 10-year indicator is added into the current project, most companies will mainly develop short-term capital models and not enough will consider long-term perspectives.

The same reasoning applies to governments: Was there an incentive for them to limit or to encourage easy access to credit? The answer is not the same with short-term and long-term views, but elec-

CONTINUED ON PAGE 18

From Liquidity Crisis to Correlation Crisis … | from Page 17

tions are a key factor to help them choose their strategy! This led them to underestimate the guarantees they would have to give to keep the financial system up. The guarantee that governments provide to some financial institutions should be studied in detail because of the competitive advantage it may generate under some circumstances if one does not pay attention.

After the threat of economic crisis in 2009, we may face in the 2010s and in the 2020s other correlation crises that could arise from illiquidity, pandemic, inflation, oil peak, climate change, pollution, a natural disaster, etc…. To limit their financial consequences and ensure the long-term viability of our financial system, I believe we need to put more emphasis on fundamental and applied research and use continuous professional development to train ERM experts with both quantitative and qualitative expertise. These experts would be able to identify, quantify and manage risks faced by insurance and financial institutions from the underwriting process to investment strategies.

For some risks, studies with mutualized data by researchers, federations of insurance companies and banks and international institutions should be carried out to avoid blind trust in black-box models. This would help us to find out which risk indicators would be relevant for better risk management and regulation.

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Investment Management In a Risk Management Context[1]

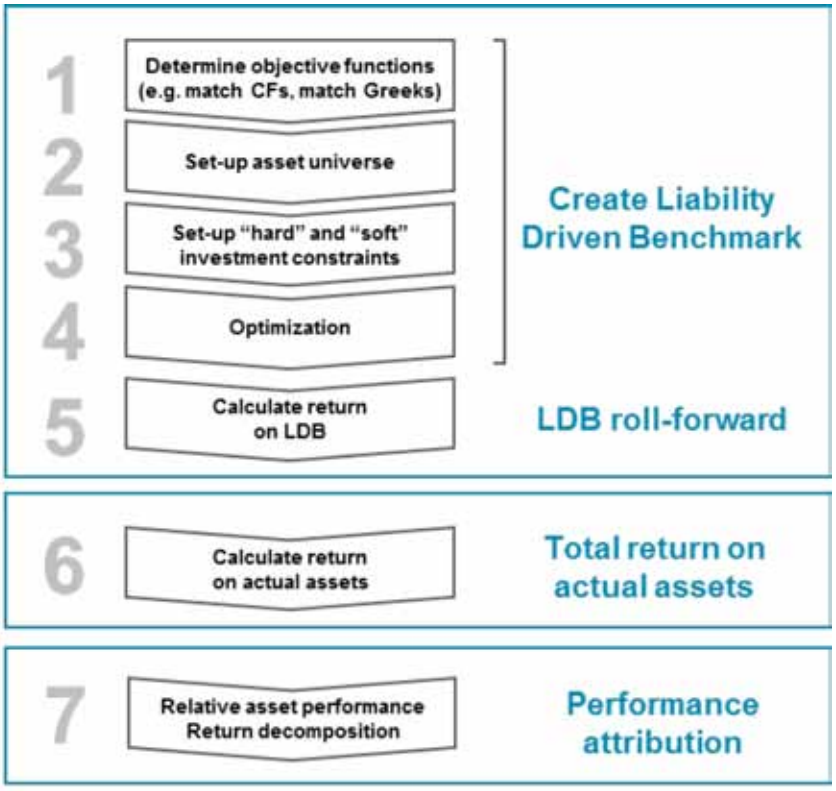
By Robert Berendsen and Steven Chen

INSURANCE COMPANIES TYPICALLY FUND FUTURE LIABILITY OBLIGATIONS BY TAKING AN ACTIVE INVESTING APPROACH WHICH IS EXPECTED TO EARN EXCESS RETURNS OVER A PASSIVE INVESTING STRATEGY. From the insurer's perspective, the ability to match liability cash flows with a diversified pool of assets generates positive economic value. Although it is clear that active investing is a key element of insurance companies' business models, there is significant debate between the risk management function and the investment management function on whether it is appropriate to take on additional risks in exchange for the opportunity of obtaining a higher return. Specifically, there seems to be great uncertainty and subjectivity involved in discussing investment performance under the current low interest rate and high volatility economic environment.

From a risk management perspective, is there a way to measure and evaluate the risk-adjusted investment performance given the characteristics of the insurance liability? This article proposes a comprehensive framework (Figure 1), which consists of the following three components:

- Liability Driven Benchmark (LDB)
- Total return on actual assets
- Relative asset performance and return decomposition

FIGURE 1



LIABILITY DRIVEN BENCHMARK (LDB)

Large insurance companies generally employ thoroughly integrated benchmarking approaches to manage and evaluate their investment function. These approaches typically incorporate asset maturity, liquidity profiling and cash flow analysis, as well as customization of market indices in line with portfolio allocation and constraints. However, such a benchmarking process faces certain shortcomings; in particular, it does not provide guidance on how to invest the assets, nor does it consider risk management. In contrast, LDBs would require insurance companies to integrate asset liability management with investment policy development. This includes matching asset maturity structures to required liability payments, modeling asset prepayment behavior based on asset optionalities, analyzing liquidity to cover downside risk, and setting asset allocations which optimize the risk-adjusted return. Through LDBs, internal portfolio managers and third party investment managers would receive explicit investment guidance for each product or business line based on the liability characteristics.

So, how would one develop such benchmarks that are liability-driven? One way is to construct LDBs using the asset-based liability replication portfolio (RP). The idea is to develop a proxy portfolio which consists of a basket of capital market instruments that in aggregate

CONTINUED ON **PAGE 20**

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Investment Management … | from Page 19

mimic certain liability characteristics within a pre-specified tolerance and often over a range of parameter outcomes, usually market risk factors. In addition to providing the advantage of reducing computing time for valuing the liability, an asset-based liability RP translates a liability into an investible set of assets which represent the best possible real world capital markets match from an ALM perspective.

The construction of an asset-based liability RP boils down to solving an optimization problem whose goal is to find the "best possible value" that a function can take subject to a number of constraints. Typically, three factors need to be considered in an optimization problem: (1) the objective function, (2) decision variables, and (3) constraints.

1 Objective function: Referring back to the RP context, the objective function could be minimizing Greeks[2] mismatch, minimizing cash flows mismatch, or a combination of the two. Each approach has its advantages and disadvantages. For example, cash flow replication provides more information about the underlying structure of the liability but constructing the RP would take longer and would require more resources. On the other hand, Greek matching can be used for financial risk management but frequent rebalancing may be required.

2 Decision variables: The decision variables would be the amount of each asset in the RP, where assets are selected from a specified asset universe. Depending on the type of liabilities, the asset universe can be limited to only plain vanilla instruments such as zero-coupon bonds and par bonds or can expand into derivative instruments, such as caps, floors and swaptions, to capture optionality. More exotic derivatives such as range accrual notes or look-back options could also be used but are often excluded because they lack the liquidity desired for portfolios that require frequent rebalancing. Thus, when trying to match a liability with significant optionality, the selection of the asset universe becomes an art rather than an exact science. A pragmatic approach is to keep the asset types simple and the number of assets as small as practical to avoid overfitting and to maintain stability. *Simplicity is the ultimate sophistication.*

3 Constraints: Investment constraints would need to be reflected. There are "hard" constraints that cannot be breached due to regulatory requirements. For example, there could be limitations on short positions or maximum positions in options. "Soft" constraints may also be introduced to reflect company-specific requirements or risk appetite. For example, a company whose objective function is to minimize differences in cash flows but that also has a key focus on duration matching would constrain the duration of the RP to be equal to the duration of the liability.

Note that the decision process on the objective function, decision variables and constraints would ideally involve professional input from the investment, risk management, pricing and product development, and valuation areas. Best practice would be to facilitate such interactions before constructing the LDBs rather than imposing them afterward.

4 Once the decisions are made, commercial software is available to run the optimization. Care should be taken to ensure the optimization routine is robust and is capable of finding the globally optimal solution, rather than one that is only locally optimal.

5 The return on the LDB can then be calculated by holding the RP static throughout the period and taking the ratio of the gains or losses on the RP to the market value of the RP at the beginning of the period. This calculation is quite straightforward since the values of those assets are readily available in the market.

TOTAL RETURN ON ACTUAL ASSETS

6 To calculate the total return (i.e., income plus realized and unrealized capital gains/losses) on actual assets, the recognized industry standard for calculating and presenting investment performance is the Global Investment Performance Standards (GIPS®) developed by CFA Institute. It provides a framework to compare investment management performance in a fair and consistent manner. According to industry surveys, approximately 70-90 percent of investment managers worldwide are either GIPS compliant or plan to achieve so.

"this type of analysis... helps determine if pursuing an active investment strategy adds or destroys economic value."

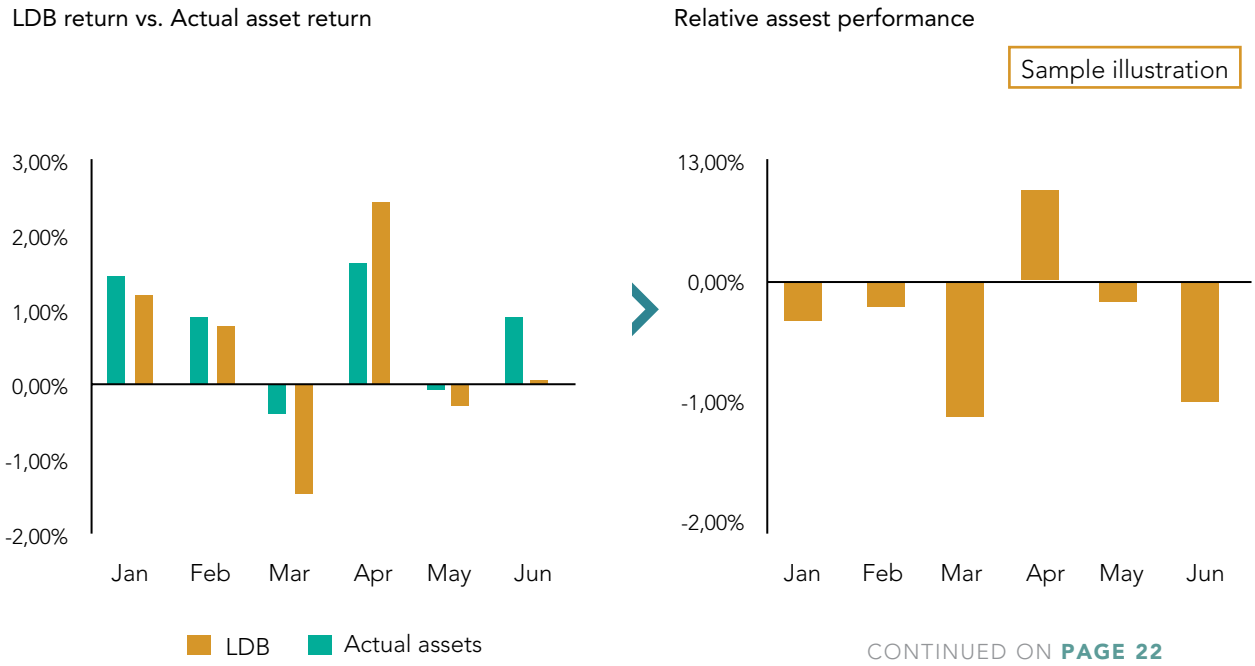
The investment arms of many insurance companies are not GIPS compliant and lack the resources and IT infrastructure to achieve compliance in the near future. For example, the 2010 GIPS requires firms to value portfolios on the date of all large cash flows and calculate time-weighted rates of return adjusted for external cash flows. This is not an easy task and can be costly. Therefore, as an alternative, an approximation using the Modified Dietz method to approximate time-weighted rates of return adjusted for daily-weighted external cash flows can be used.

The main advantage of the Modified Dietz method is that it is not necessary to know the value of a portfolio on every day that a cash flow occurs. The disadvantage is that the method does not provide an accurate estimate of the true time-weighted rate of return. The inaccuracy is at its worst when one or more large cash flows occur and the markets are highly volatile.

RELATIVE ASSET PERFORMANCE &RETURN DECOMPOSITION

7 Having calculated the return on the LDB and the one on the actual assets, we can now compare the returns. For this comparison to be fair and have any meaning, the returns should be compared over a sufficiently long period, or over several shorter periods, the latter providing additional information about the volatility of the actual returns versus the benchmark. This type of analysis provides insights into whether actual assets over-perform or under-perform the LDB, which, in turn, helps determine if pursuing an active investment strategy adds or destroys economic value. Figure 2 illustrates a sample output.

FIGURE 2
RELATIVE ASSET PERFORMANCE



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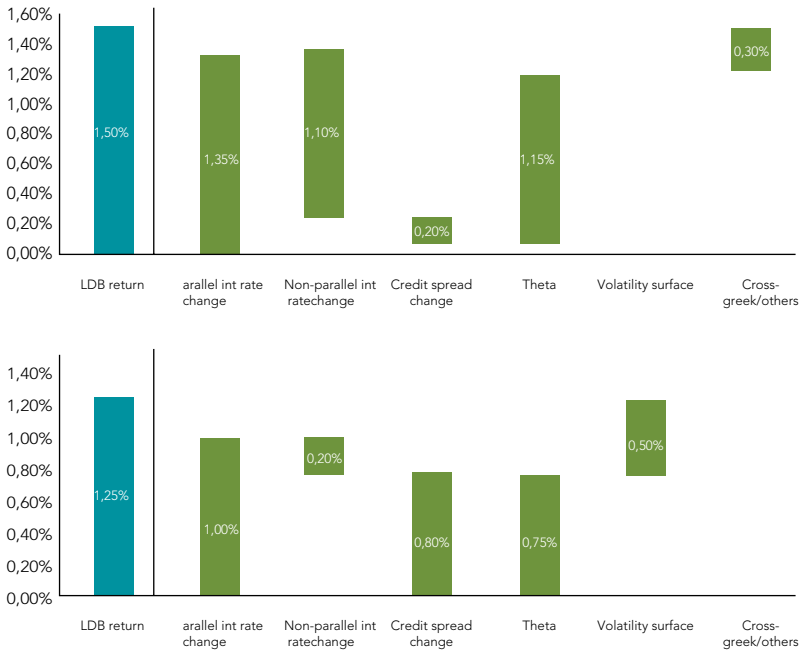
Investment Management … | from Page 21

A more detailed comparison can be performed by decomposing the return attributed into different market risk factors. For example, the LDB can be rolled forward under a series of step-wise changes in market risk factors (e.g., interest rate shifts, bond credit spread changes, Vega, etc.) to demonstrate the impact of the risk factors on the LDB. A similar decomposition can be done for the actual asset return. Such comparison could provide further insights into the return and its attribution on a risk-adjusted basis. Figure 3 illustrates a sample output.

FIGURE 3
PERFORMANCE ATTRIBUTION

Sample illustration



CONCLUDING REMARKS

Insurers typically receive premiums upfront and pay claims later. This "collect-now, pay-later" business model that leaves insurers holding large sums of money, which Warren Buffett called "float," is essential to the way the insurance industry works. The cost of the float depends on the insurer's underwriting practice whereas the benefit of the float can be largely realized by the insurer's investment management. Therefore, a comprehensive approach which integrates the ALM and investment strategy process into an overall risk management framework such as proposed herein can provide significant value to the long-term soundness and success of an insurance company. ■

END NOTES

1 The views in this article only represent the authors' personal opinions. This article does not represent any statements from the organization where the authors are employed.

2 The Greeks are the quantities measuring the sensitivity of the value of a financial instrument to a small change in a given underlying parameter on which the value of the instrument is dependent.

"Effective Resilience" and Interdisciplinary Approaches to Risk

By Rick Gorvett

Editor's Note: *This essay was originally published in the "Risk Metrics for Decision Making and ORSA" essay e-book and was the second prize winner in the Call for Papers. It has been reprinted here with permission.*

ENTERPRISE RISK MANAGEMENT (ERM) IS AT A CRITICAL POINT IN ITS EVOLUTION AS A PROCESS.

After more than a decade of development, there seems to be little doubt about the appropriateness of a holistic, ERM-type perspective for identifying, quantifying and managing risks. Much of ERM's evolution thus far has involved the marketing of its framework and potential, and while there continue to be a few holdouts against this approach to risk management, most people and organizations do recognize the inherent logic and sensibility of an ERM process (while sometimes disagreeing about the specifics of its implementation). Overall, certain guiding principles of ERM generally seem clear—for example (among many):

- Risks should be viewed within the context and framework of the entire firm—including its operations, market strategy, human resources, etc.
- ERM is "everyone's business"—all members of an organization should be familiar with, invested in, and have a role in the process.
- Successful implementation of ERM requires a high-level advocate in the organization.

These, and many other, guiding principles are clearly important and foundational. However, now that the basic ERM idea has been successfully marketed, practitioners and researchers in ERM need to build upon these core concepts. With the ever-expanding interest in such things as stress-testing and economic capital, and the potential introduction of mandated evaluations such as the National Association of Insurance Commissioners' (NAIC's) Own Risk and Solvency Assessment (ORSA), additional meat and muscle need to be added to our emerging skeletal risk management structure.

There are still many advances to be made in both the conceptual and technical underpinnings of ERM. Only with the creation and development of those enhancements—many of them of a quantitative nature—will ERM ultimately live up to its full potential.

AN INTERDISCIPLINARY PERSPECTIVE

One suggested enhancement to risk management and ERM is to broaden our framework and reference base—i.e., to recognize the potential of advances in other fields and disciplines to enlighten our understanding and analyses of risks. For example, areas such as behavioral economics and complex systems, while sometimes unfairly considered to be "flavor-of-the-month" pop fields of study, actually have developed important techniques and insights, which may have direct relevance for risk management. Certainly, a better understanding of human cognitive tendencies and methods of decision making, and then incorporating those dynamics into the risk management analytical framework, is a worthwhile and important endeavor, and can help us to better appreciate the nuances of people's perception of, and reaction to, risks.

AN "EFFECTIVE RESILIENCE" FACTOR

Another suggestion is to enhance our toolkit for quantifying risks by, as much as possible, considering risk in a multidisciplinary context. As a particular example, a risk metric, *effective resilience*, is suggested.

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"Resilience" is a widely used and applied word, both in everyday language and in various fields of study. The term has been used to represent a technical measure in fields such as ecology, systems engineering, psychology, economics and materials science. Although the details and specific applications differ, the term has a common core meaning across these different areas: resilience represents the ability of a system (or an organization, or an individual person) to recover or "bounce back" from an adverse situation or event. Resilience is both an intensity- and time-dependent function of a system: initially, the level of adversity suffered by the system depends on the intensity (or magnitude) of the event; generally, the level of recovery of the system increases over time (i.e., the adverse position of the system is gradually

CONTINUED ON **PAGE 24**

"Effective Resilience"… | from Page 23

diminished due to recovery/risk management efforts). Put another way, the ability to respond to, and recover from, an adverse event and its negative impact—across both intensity and time dimensions—directly affects the organization's operating level.

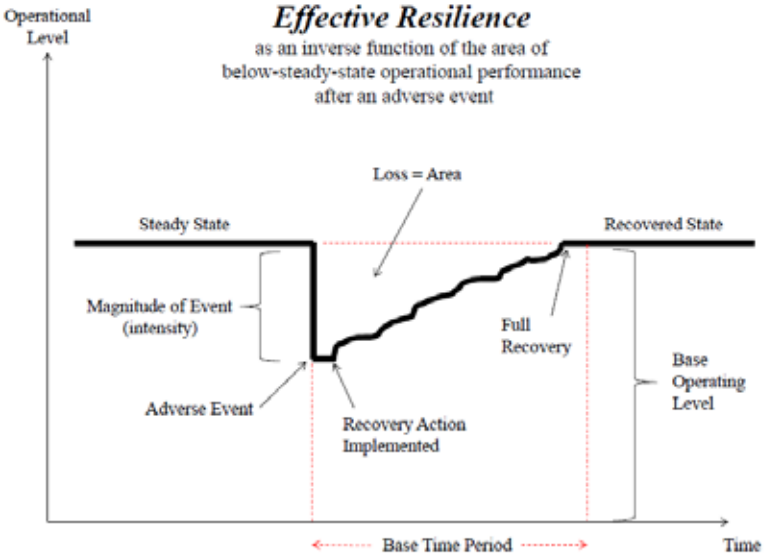
An *effective resilience factor*, then, is a risk metric that reflects an organization's exposure and response to an adverse event, and measures the ability of the organization to mitigate the reduction in its operating level. A generalized example is found in the accompanying exhibit.

For a given *Base Time Period* and *Base Operating Level* (the product of which is the **Base Area**, which reflects normal or steady state operations in the absence of an adverse event), a smaller *Loss Area* (the area of reduced operating level, below the steady-state level and above the organization's recovery path) in the exhibit would represent greater organizational resilience. Thus, for

$$ERF = \frac{Base\ Area - Loss\ Area}{Base\ Area} = 1 - \left(\frac{Loss\ Area}{Base\ Area}\right)$$

a given adverse event and a given risk management recovery action, the *Effective Resilience Factor* (ERF) of a firm can be determined as

Defined in this way, the *ERF* takes on a value between 0 and 1, with a value closer to 1 indicating greater organizational resilience (based on the assumed risk management/disaster recovery strategy).



The modeling of the recovery path (the gradual increase in operational level from its lowest point at or immediately after the time of the adverse event, to full recovery) would be inherently multi-disciplinary. The path would necessarily be a function of broader economic, financial and labor market factors, and (for evaluating an insurance company) insurance market conditions in light of the adverse event (which may or may not be systemic). Such modeling would require assumptions regarding, for example, consumer behavior, supply-demand shifts and interactions, and the nature and extent of interrelationships within this very complex system. A risk management strategy effectiveness metric like *ERF*, which makes explicit and transparent assumptions about these parameters and interactions, and accounts for macroeconomic and other effects consistent and concurrent with an adverse event, would be very attractive.

The exhibit shows a simple cross-section of one adverse event. To reflect a portfolio of risks to which the organization is exposed, a three-dimensional surface chart could be produced. The horizontal *x* and *y* axes would be the different intensities of adverse events, and the times to recovery, respectively. The vertical z axis would reflect the loss level associated with a given event intensity at a given time after the event (during the recovery process). The effective resilience metric could then be calculated as the double-integral, or the area under the surface. For a given list of adverse events and intensities, a firm could test and compare different risk management strategies, by observing the resulting effects on the resilience factor of changing strategies.

In summary, some of the attractive characteristics of an *effective resilience* measure are that it:

- Summarizes in one number, with a value between 0 (low resilience) and 1 (high resilience), the effectiveness of a risk management plan.
- Reflects the adequacy and effectiveness of disaster planning and recovery strategies, rather than just quantifying adverse scenarios. It thus is consistent

"... such modeling would require assumptions regarding, for example, consumer behavior, supply-demand shifts and interactions, and the nature and extent of interrelationships within this very complex system."

with the ORSA desire to promote and encourage good risk management, looked at from a broad and holistic perspective.

- Can be used to compare the relative resilience of different organizations to a common hypothetical adverse scenario.
- Can be used to compare, for an individual organization, the relative effectiveness of different operational and recovery strategies in response to a hypothetical adverse scenario.

By informing our risk management evaluations and decisions with interdisciplinary concepts and techniques, and recognizing the potential impact of risks on all scales—company, market and economy—of the operating environment, we will create a more effective and robust ERM process. ■

Liquity Risk In An Insurance Operation

By Derek Newton, David Sanders, and Gary Wells

Editor's Note: *This paper was originally published by Milliman, Inc. It has been reprinted with permission here.*

MANY PEOPLE THINK THE POSSIBILITY OF AN INSURANCE COMPANY RUNNING INTO DIFFICULTIES OVER LIQUIDITY ISSUES IS A REMOTE PROSPECT. After all, there is no leveraging of loans as with the banks, and the reserves are backed by good, solid assets. However, this is not the case, and liquidity risk (sometimes associated with fraud) has been a source of some historic insolvencies.

During the 1970s a number of life insurers fell out of favor because of liquidity issues. Typical examples include:

- A successful insurer that paid a high introductory commission. It was so successful that the new business strain resulted in a lack of funds to meet claims.
- An insurer whose product was linked to a particular investment—indeed, it was perfectly matched. However, on maturity the company granting the loan expected it to be rolled over and defaulted.
- A number of insurers that locked into specific investments, which could not be readily realized in a short time. The investments included property and significant holdings in a particular stock.
- Fraud when the nominal investments were not actually held or were worthless.

In the 1990s there were other types of liquidity problems. A large catastrophe would result in a substantial volume of original losses and these would be compounded by the "inflation" effect of the London market excess of loss (LMX) catastrophe spiral. As a consequence, many insurers were paying out claims with a delay in collecting the reinsurance. This was financed by banks and by brokers in the form of short-term loans against the expected reinsurance recoveries. The crunch came when one of the insurers became insolvent and didn't meet the claim, resulting in a default. Credit then dried up, which led to a cascade of liquidity problems.

But all of this is in the past and won't happen again. Or will it? Conventional wisdom has it that the fixed interest investment backed by an AAA rating could only remotely go wrong—that investment in major financial institutions (banks and insurers) is perfectly reliable. Unfortunately, however, you can readily put names to a number of entities that have got it wrong.

The Bank for International Settlements found in a report in 2006 that whereas banks had integrated liquidity risk into their risk management system, the same was not true for insurance operations.

Three approaches are used in practice to manage liquidity risk:

1) The company maintains a block of unencumbered assets that can be drawn on at any time to meet a liquidity problem.
2) The company tries to match the cash flow of assets and liabilities.
3) The company uses a combination of these two.

Life insurers generally go for the second approach, but what about general (property & casualty) insurance companies, where cash flow is usually more difficult to predict? A typical personal-lines insurer will have a reasonable estimate of its cash flow, with the only likely exception being a major windstorm or flood, which will give a surge in claims (and associated reinsurance recoveries). However, these are generally manageable as the full amount is often not paid for a period after the event, when repairs are finally completed. It is important to note that in the Basel paper the examples of stress test given relate almost entirely to life insurance, and little to general insurance companies.

The situation of commercial lines insurers and reinsurers is more difficult assess. With catastrophes, there are clear liquidity issues that may be greater than that of a personal-lines insurer. In addition, there is the prospect of significantly large claims where there is reliance on the reinsurance program.

In respect of Lloyd's syndicates there is a further liquidity issue in that U.S. trust funds are maintained gross of reinsurance, producing a funding strain over the net reserves. It is also not a straightforward process to release such funds when most needed.

A recent consultation paper from the Financial Services Authority (FSA)—CP09/14, "Strengthening liquidity standards 3: Liquidity transitional measures," released in June 2009—sets out the regulator's proposal for transitional measures to aid implementation of the FSA's new liquidity regime and further underlines how important it is to be prepared. However, it appears to relate only to banks and deposit takers and no reference to insurance operations is made.

Liquidity risk for insurance companies appears not to have been a major issue from the FSA point of view. In the integrated source book, the FSA identifies issues represented in the examples set out above, namely a concentration of assets and the inability to realize the value of the assets at a certain time. However, there has been a significant change in the FSA's attitude.

The reason for this change is the impact that liquidity risk had on the banking system in the recent credit crunch; the surprising fact that in these circumstances it was much more significant than credit risk. Another impact of the credit crunch was to make investments illiquid either because they couldn't be traded or their valuation dropped so much nobody cold afford to realize them.

Lord Turner, in a speech given earlier this year, stated:

"New approaches to the management and regulation of liquidity are equally important. Indeed, we need to ensure that the regulation of liquidity is recognized as being at least as important as capital adequacy, a sense which was to a degree lost over the last several decades, with intense regulatory focus and international debates on capital adequacy, but less focus on liquidity—no Basel 1 or Basel 2 for liquidity to match the equivalents for capital."

Again, Lord Turner concentrates on banks. As the regulation should apply to all regulated entities, where does this leave the insurance sector? Genera insurance companies often view their exposures to liquidity risk as being a consequence of a major catastrophe, and thus see liquidity risk as being contained with insurance risk, investment risk, and/or credit risk. The general reasoning is that, because catastrophic events are rare, concentration is placed on managing vulnerability to such events.

This was precisely the attitude of banks—a catastrophic event such as a run on the bank hadn't been seen for years and the system was designed to stop it. A series of large catastrophes could readily make the insurance sector equally vulnerable.

The other area not considered is monocline operations, where the claims are not a function of random events but are the subject of correlated (often economic) and related events. In the early 1990s mortgage guarantee products were extended so that, by an insurance policy, an insurer would upgrade the rating of a security based on mortgage loans and other financial transactions. After a period of calm when the market forgot about the problems of these contracts, the same issues have emerged as credit default swaps were created with ratings guaranteed by insurance contracts (this time with AIG being a major player). History repeated itself, and whereas in the 1990s many insurers were on the edge (without falling over it), this time there were also serious liquidity problems with AIG and it needed substantial financial aid from the U.S. government to continue operating. One of the issues raised in these transactions is that banks are on both sides of a trade, and thus can offset one position against another, avoiding much of the liquidity issue. The same is not true for insurance operations, which are on one side of the transactions only, and do not have the offset facility.

One consequence of this will be that insurers will also be in the liquidity framework (it could be that unintentionally it forms part of the banking requirements). One thing is certain: the consideration of liquidity risk is no longer a minor element of the risk management of an insurance operation. ■

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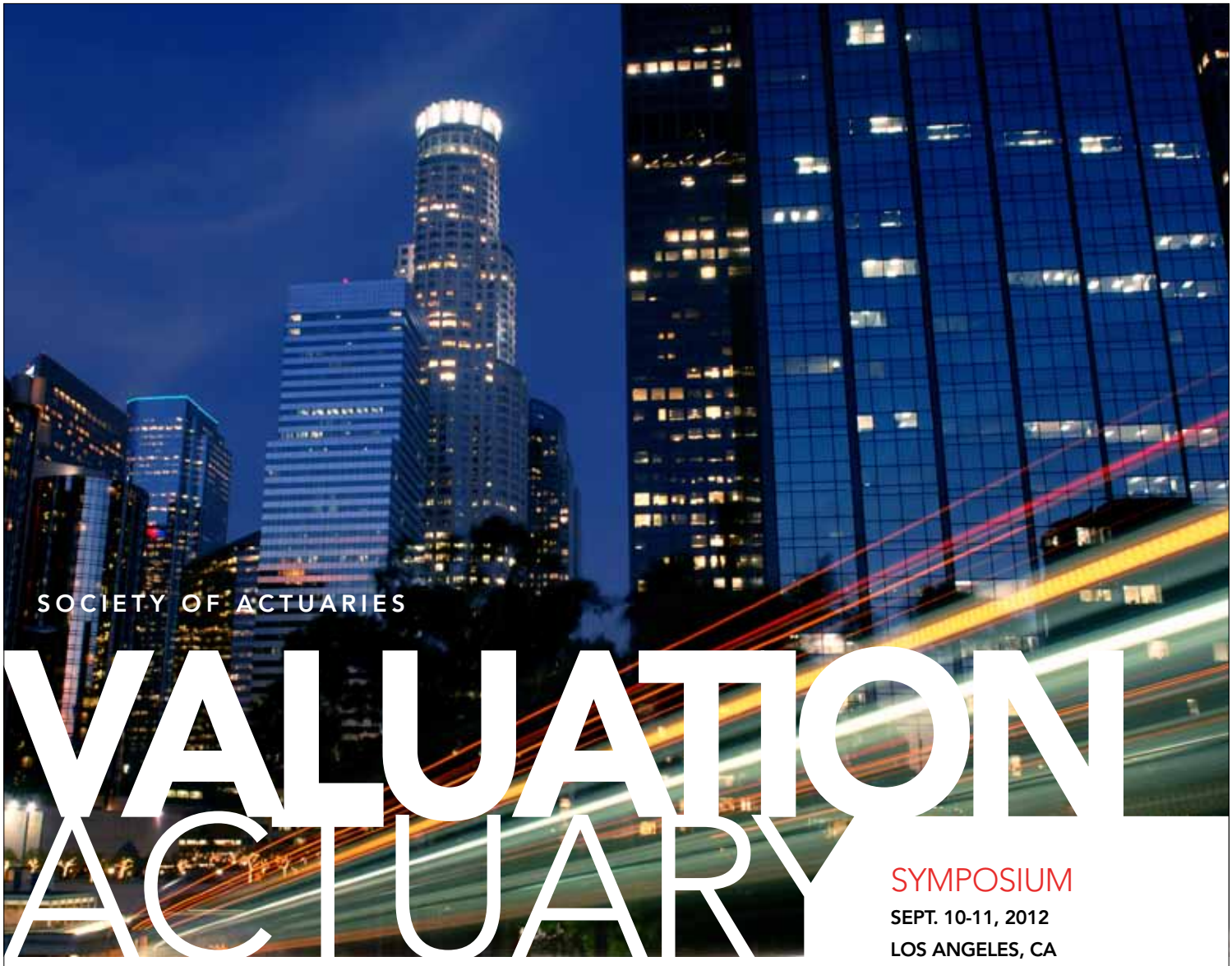

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Understand ORSA Before Implementing It

By Anthony Shapella and Owen Stein

Editor's Note: *This essay was originally published in the "Risk Metrics for Decision Making and ORSA" essay e-book and was the first prize winner in the Call for Papers. It has been reprinted here with permission.*

THE NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS (NAIC) is moving forward to implement a new regulatory requirement that requires U.S. insurers to perform an Own Risk and Solvency Assessment (ORSA). Before developing a response to the ORSA requirement, insurers will want to understand its genesis and the underlying rationale for it, as well as its implications. This article provides an overview of the evolution and rationale for ORSA, as well as practical implications for insurers as they begin to design an ORSA process.

THE EVOLUTION OF ORSA

The new ORSA requirement is one component of the NAIC's initiative to bring the U.S. regulatory regime into alignment with the Insurance Core Principles (ICPs). The ICPs are developed by the International Association of Insurance Supervisors (IAIS) and outline "the requirements for an effective insurance supervisory system." Almost 200 countries, including the United States, have joined the IAIS and all have agreed to be bound by the ICPs. The International Monetary Fund and World Bank regularly review these countries—through a Financial Sector Assessment Program (FSAP)—to ensure that local insurance regulation meets the ICP principles.

To date, the U.S. insurance market has not fully appreciated the extent to which insurance regulation is being "globalized" through the IAIS, around the ICPs. The ICPs are international mandates and, as the largest insurance market in the world, the United States faces tremendous political pressure to adhere to them. Given its prominence, the United States has started to direct its political influence toward the evolution of the ICPs through active participation in the IAIS. This activity will continue with the new Federal Insurance Office, which will work with the NAIC to effectively influence ongoing regulatory developments at the IAIS.

The U.S. ORSA is a byproduct of the ICPs. ORSA requirements established in the United States, and abroad, must meet the minimum standards set out in ICP 16—Enterprise Risk Management for Solvency Purposes. ICP 16 requires the supervisor to establish enterprise risk management standards that require insurers to identify, assess and address all relevant and material risks. Specifically, ICP 16.11 states that, in an effective insurance supervisory system:

> The supervisor requires the insurer to perform its own risk and solvency assessment (ORSA) regularly to assess the adequacy of its risk management and current, and likely future, solvency position.

The United States is not alone in implementing new ORSA requirements. For example, similar requirements are being established in Canada, Bermuda, Japan and Australia, as well as all of Europe. Others in Asia and Latin America will likely follow suit. In general, these regulators expect "reciprocity," such that an ORSA prepared for one jurisdiction will satisfy the requirement in others.

ICP 16 is about 30 pages in length, and insurers embarking on ORSA implementation would be well-served to review the entire document to understand the underlying drivers behind the new NAIC requirement. While the U.S. ORSA requirement has some unique features, it will meet these basic requirements. That said, a few points are worthy of further discussion.

ORSA—IT'S A PROCESS

In assessing the implications of ORSA, one must differentiate between (a) the ORSA process itself, and (b) the ORSA regulatory requirement.

The ORSA Process

The ORSA process is an internal activity of the company, which consists of—what most would consider—good enterprise risk management. In essence, it is an internal assessment of the risks associated with an

CONTINUED ON **PAGE 30**

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Understand ORSA Before Implementing It … | from Page 29

insurer's business plan, and the sufficiency of capital resources to support those risks. It includes ongoing processes to support:

- Risk identification and prioritization
- Risk measurement
- Articulation of risk appetite and tolerances
- Implementation of risk limits and controls
- Development of risk mitigation strategies
- Capital adequacy assessment
- Governance and risk reporting.

ORSA's defining element is the linkage it creates between risk management, capital management and strategic planning. Within the ORSA, the company is expected to self-assess its current and future capital adequacy in light of its two- to five-year business plan.

The ORSA Requirement

Beyond establishing an ORSA process, insurers will need to prepare materials to evidence the efficacy of the process to external parties. The NAIC's *ORSA Guidance Manual* indicates that those insurers required to conduct an ORSA will also be required to provide a high-level summary report annually to the domiciliary regulator, if requested. The three sections of the ORSA Report will (1) describe the company's enterprise risk management program; (2) summarize the company's risk assessment for each material risk; and (3) describe how the company aggregates individual risk assessments to determine the level of financial resources it needs for its current business, and for its planned business over its planning horizon.

In addition to the ORSA Report, companies will be required to assemble and maintain documentation of all aspects of their ORSA process, which may be used for more in-depth on-site reviews. ORSA materials will eventually be integrated into regulatory examinations, helping state insurance departments determine the scope, depth and timing of each insurer's exam and informing the state regulator's new risk-focused examination approach.

ORSA—PRACTICAL CONSIDERATIONS

At its core, the original purpose of the ORSA was to foster internal risk management within each insurer, enhance management awareness of the interrelationships between risks, and increase understanding of the relationship between overall risk exposure and the capital needed to support it. A predicate belief is that better internal risk management at all insurers is in the public interest because it will reduce insolvencies and enhance capital efficiency across the global insurance industry. The original proposers articulated a number of principles for the ORSA. For example, an ORSA should:

- Be the responsibility of the company
- Incorporate a forward-looking assessment of all material risks
- Be embedded into the decision-making processes of the business.

While some companies may choose to treat the ORSA as an entirely new regulatory reporting requirement, that is not the intent, and insurers will be missing an opportunity if they approach it in this manner. Instead, companies should recognize that the ORSA encompasses most of what is considered good risk management practice (see figure below), and that the ORSA requirement should therefore serve as a catalyst for implementing risk management internally.

Of course, to genuinely foster risk management, insurers must be allowed to develop and conduct their

"A predicate belief is that better internal risk management at all insurers is in the public interest."

ORSAs in a manner that is consistent with the scope and scale of their business, internal culture and management structure, and chosen approach to enterprise risk management. The NAIC's *ORSA Guidance Manual* explicitly recognizes that each insurer's ORSA process will be unique, and currently provides insurers relative latitude in the design of the internal ORSA process. Thus, insurers have the opportunity to leverage much of their existing enterprise risk management capabilities to develop an ORSA process that is maximally useful to the management of the business. In addition, it affords companies the ability to evolve their ORSA over time, in light of successes and failures. The insurance industry, and particularly the North American CRO Council, has worked hard over the last few months to limit the introduction of prescriptive requirements into the conduct of an ORSA. From a policy standpoint, the introduction of ORSA will not be of benefit to the public if it evolves into a highly prescribed regulatory compliance exercise, and the industry will need to continue to resist efforts to add prescriptions that will make it so.

Embedding the ORSA process into business planning is fundamentally important. An effective ORSA will be more about process than results. Unlike risk-based capital, where every company has an "RBC ratio," there will be no "ORSA score" at the culmination of the ORSA exercise. Instead, ORSA effectiveness should be gauged by the extent to which it is integrated into decision making and planning, both at the strategic and the day-to-day level. Effectiveness of processes, such as monitoring for adherence to risk limits—consistent with the adopted risk appetite—are key to the implementation of ORSA. Ultimately, the litmus test for ORSA will be how management responds to the next financial crisis or threat. To this end, the NAIC has placed great emphasis on fostering an interactive dialogue between financial examiners and executive management on the process itself—not just the numeric output.

To further this point, an effective ORSA will be more qualitative than quantitative. While it will be natural for actuaries to think of the ORSA as essentially just another application for their financial models, that is also not the intent. In fact, the NAIC's *ORSA Guidance Manual* does not even require the insurer to employ an economic capital model. Stress-testing of the financial balance sheet against regulatory and rating agency capital requirements could be sufficient, if that is how the company chooses to internally manage risk. In essence, the ORSA needs to balance and integrate the quantitative risk analysis with qualitative risk management processes.

It should also be noted that an important aspect of ORSA is that it is to be conducted on a group-wide basis. This makes eminent sense, as that is how the business is ultimately managed. Larger companies may choose to conduct ORSAs within major business segments, and then aggregate up from there. Given that the goal is to integrate the ORSA into decision making, decisions about how to organize the ORSA will vary from company to company, depending on how they choose to organize themselves for other purposes. Some have suggested that ORSA Reports be prepared for each legal entity, as well as the group as a whole. This makes little sense. While there is sometimes coincidence between business segments and legal entities, this is more often not the case.

Finally, ORSAs will eventually serve as a source of information for the regulators about the insurer's risk management program and capabilities, as well the risks it faces and its internal capital resources. While this certainly has the potential to enhance supervision, particularly if it is used to focus regulatory examinations on key risk issues, it will require the development of stronger risk management capabilities within the supervisory community before such information can be effectively utilized. Supervisory staff will need to be able to differentiate between strong and weak risk management practices, requiring skills that are typically not present in many state insurance departments. In addition the information will not be uniform across companies (by design), which is countercultural to most regulatory environments. As the ORSA requirement is implemented, we should expect natural pressure from supervisors to try to establish additional standard reporting requirements to facilitate "benchmark" comparisons across companies, and standard reporting formats to facilitate checklist reviews. The insurance industry will need to resist these

CONTINUED ON **PAGE 32**

Understand ORSA Before Implementing It … | from Page 31

pressures, to the extent that they are counterproductive to the intended purposes of the ORSA.

In sum, ORSA is an insurer's internal process of self-assessing its material risks and evaluating the capital to support them. The design of an ORSA process should consider the insurer's existing enterprise risk management framework and focus on balancing quantitative and qualitative elements. Ultimately, the test of a successful ORSA lies in its ability to improve the insurer's risk and capital management processes and influence strategic decisions. Finally, the ability to communicate the process to regulators will be fundamentally important given the unique nature of the ORSA information.

Towards a Risk Management Profession

By David Ingram

Editor's Note: *This article was originally published in the June/July 2011 issue of* The Actuary. *It has been reprinted here with permission.*

DURING THE DOZEN OR SO YEARS THAT I HAVE BEEN VOLUNTEERING FOR SOA PROJECTS RELATING TO ERM, I have heard many, many actuaries say that all their work is about risk—risk measurement and management. But risk management has been changing and evolving over that same time period. Company practices have evolved. There are new developments on the regulatory front. The actuarial profession first responded with a new educational certification, the CERA, and is now working towards professional standards of practice.

Insurance solvency regulation is moving into new territory. Insurer and reinsurer management and boards will now be required to issue a statement that reflects their judgment about the firm's viability, including its capital adequacy. This is an abrupt shift from the longstanding practice where regulators specified the exact basis for assessing insurer solvency. This will require management and the board to develop new thinking about risk, risk management and capital. They will need to agree upon the risks, the risk management capacity, and the necessary capital as well as the impact of future plans of each insurer, instead of operating in the safe harbor that is specified by the regulator.

This change is due to an agreement in October 2010, by the international insurance regulatory community to adhere to a set of Insurance Core Principles (ICPs). This new requirement for solvency, ICP 16, is titled Enterprise Risk Management. ICP 16 calls for an Own Risk and Solvency Assessment (ORSA). This ORSA requirement was already embedded in Solvency II within Pillar 2. In the United States, the National Association of Insurance Commissioners (NAIC) has issued a proposal to implement the ORSA, which was recently under comment. It seems clear from the NAIC's approach and language that they are not looking for opinions about whether to implement the ORSA requirement, but were soliciting suggestions with regard to the specifics of implementation.

Prior solvency standards, such as the NAIC's Risk-Based Capital regime, imply that an insurer is deemed to have enough capital if it passes a certain dollar amount. The critics point out that large U.S. banks were meeting the Basel II solvency standards when they experienced very large losses and needed bailouts to stay in business. By making management and the board responsible for certifying solvency, the expectation is that they will do a better job of reflecting and monitoring the actual risk position and capital needs of the insurer.

ICP 16 requires that five elements of a risk management system be reflected in the ORSA opinion: identifying risks, measuring risks, a risk feedback loop, a risk tolerance statement, and a risk policy.

Actuaries can and will have a major role in this emerging process. Some firms will need assistance in building the processes needed to measure and manage risks, some will need help in documenting and explaining the processes that they already have in place, and a few are already well prepared. Much work is needed for actuaries to be ready for a major role in accepting the responsibilities of these new requirements. A major part of that process is education. That work is well underway with the addition of the CERA credential and related syllabus materials. This coursework provides actuaries with the educational background needed to operate as risk management professionals. To obtain a CERA, a student must master the methods that are used for risk management. Another part of that process is developing professional standards that define for practitioners, potential employers and others, such as regulators, what an actuarial risk management work product will include. The Actuarial Standards Board (ASB) has started work on that as well.

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In 2010, the ASB commissioned a task force to look into whether a need existed for a new standard or standards for ERM practitioners. That task force has come back with a pair of discussion drafts that were posted for comments to the ASB website in March. Separate documents cover risk evaluation and risk treatment.

If you agree that all your work is about risk measurement and management, then no matter what your area

CONTINUED ON **PAGE 34**

Insurance Companies' Highly Controlled … | from Page 33

of practice, please make the effort to read the discussion drafts on risk evaluation—they may have a significant impact on your practice.

If you are reading this as one of the many SOA members who practice outside the United States, you might be thinking that this applies only to U.S. actuaries. You may be surprised here. The International Actuarial Association (IAA) has a process to develop model standards of practice that may be adopted by any member association for use in its country. The IAA recently empanelled an ERM task force to develop one or more model standards on ERM. These new ASB discussion drafts may well be the starting point for the IAA work, so your attention to them is important.

The newly developing ORSA requirement of the regulators is a natural reaction to the failures of regulation and risk management of the financial crisis. The actuarial profession is keenly placed to step up and provide uniquely well-educated and professional assistance to this process. Creating a standard of practice in a developing field such as risk management is a new challenge for the actuarial standards setting process. A spirited debate is expected to result from the discussion drafts.*

At a recent session discussing ERM standards of practice at the ERM Symposium, Bob Mark, a well-known author and Professional Risk Managers' International Association (PRMIA) board member, remarked that he did not know of any organization that was working on standards of practice for individuals practicing in the risk management field. This vacuum provides an opening for actuaries to establish the first set of such professional standards in the field of risk management. At this point in time, the entire actuarial profession is a small fraction of the total number of people who are practicing risk management. But with the educational standards as expressed by the CERA and the professionalism that will be codified by the new standards, actuaries will certainly be seen as the source of some of the best risk management work available. ■

A Friendly Conversation Emerging Markets—Enterprise Risk Management within the Banking Industry

By Jawwad Farid

Editor's Note: *This article was originally published in the June/July 2011 issue of* The Actuary. *It has been reprinted here with permission.*

THE MIDDLE EAST is filled with interesting cities and paradoxes; none more interesting than Dubai. For a city estate with fewer than 3 million souls, it boasts more banks than neighboring nations with many times the population. Once upon a time in a different world, the profitability generated by regional banks in the union of city states known as the Emirates surpassed the combined profitability of the same banks in India, Pakistan, Sri Lanka and Bangladesh.

The year was 2006. I had just stepped into the treasury of one of the largest banks in the Middle East. The treasurer I was meeting was a referred lead. Our conversation started off pleasantly, but then I mentioned that I built and sold risk systems for a living.

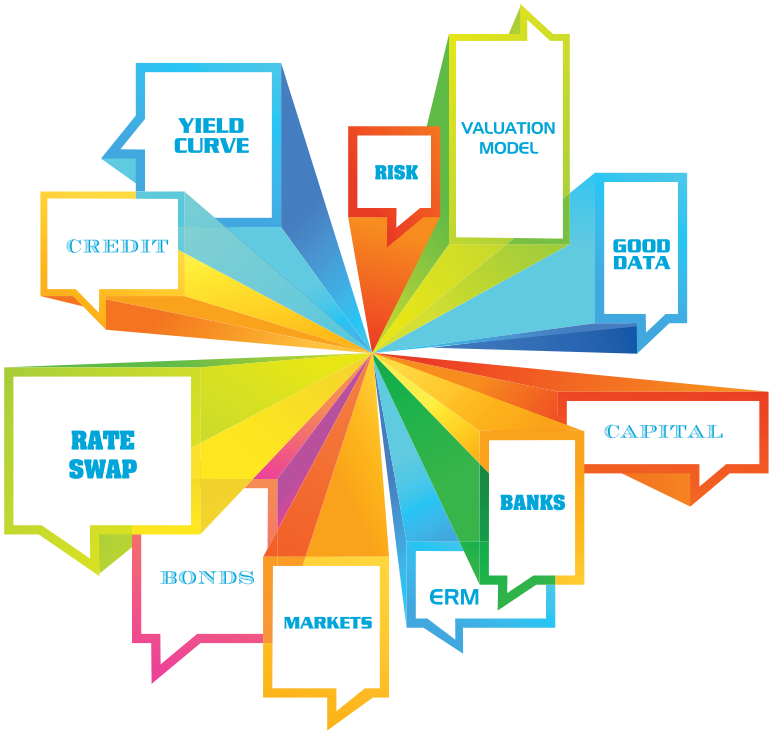
"You are wasting your time in the Middle East. Every single bank in this city is overcapitalized, we hardly ever see any defaults and we are all cash rich. Why would anyone in his right mind throw away good money to buy capital adequacy, risk management and liquidity software? Even if I did buy the software, who would run it? Where would I get the data to work and calibrate these models?"

"How about bank regulation and regulators as an incentive?" I countered.

"You have me there, but you still can't help me with the data and your models break down every time my markets sneeze so I still don't see the value in them."

When I started working as a risk consultant the mindset represented by the above conversation used to stump me. Clients basically said:

a. Risk systems are for dummies and the only reason anyone would buy them is the push by the banking regulator for the enforcement of Basel II regulations. Other than regulation, there is no business case.
b. You need talent, experience and data to configure and run risk platforms and all three are missing in markets that can at best be described as illiquid, inefficient and incomplete.
c. In a culture where intuition and experience were given heavier weight, a broken, inaccurate model would only go so far in a management committee meeting.
d. You can't run a credit relationship off a model. There is a reason why it is called a relationship.



Over the last eight years a few things have changed. On the negative front, given market, credit and operational risk losses realized in 2008–2010, banks in the Middle East are no longer overcapitalized. Margins are significantly lower, asset write-downs (provisions or increase in reserves) are higher and the financial services sector has been hit by a wave of defaults across retail and corporate segments. Where stringent immigration entry/exit controls are in place and expatriates cannot take exposure to real estate, retail defaults have been controlled by what one would call non-banking measures. But in cities like Dubai, Ajman and Sharjah, customers simply walked away from cars, properties, jobs and lives and went back to

CONTINUED ON PAGE 36

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A Friendly Conversation: Emerging Markets | from Page 35

their own countries. Liquidity finally became an issue as banks cut their lines in response to forced rollovers, counterparty defaults and rising losses in investment portfolios.

From a governance and data point of view, significant challenges still remain. Good data is a problem for reasons that we will discuss in just a moment. Compliance and governance frameworks are missing teeth and bite and the mind-set around risk is very much checklist and compliance driven.

WHY IS RISK MANAGEMENT DIFFICULT IN THIS PART OF THE WORLD?

Let us look at the biggest issue that comes up on a daily basis—data.

While market or price risk is only a small part of the overall exposure of a bank's balance sheet, the absence of good data impacts asset liability decisions, the banking book, transfer pricing and, by definition, the interest rates that get charged to credit customers. Absence of good data doesn't just impact the investment portfolios; it questions the assumptions on which the bank is run.

Good data is dependent and linked to the depth and activity in secondary markets and transparency and record keeping by the central bank in interbank activities.

The common component across market risk is the availability of prices at which securities trade and exchange ownership in secondary markets. A challenge in the developing world is the availability of this data for treasury and corporate debt as well as listed securities. Treasury markets become doubly important because without a treasury term structure it is difficult to build a treasury yield curve, and without the yield curve you can't build zero and forward curves or price swaps, caps, floors or swaptions. Some markets have addressed the thin trading problem by creating mechanisms for quoting indicative rates and prices.

For example, in one of the countries where we work with clients, the daily turnover in the three- and six-month maturity treasury bill is about U.S. $200 million. Yields range between 10- to 13-percent on the three-month paper depending on liquidity, coverage, demand and market sentiments. The two papers (three- and six-months) are the most liquid instruments in that market and the bid-offer spread (the difference between buying and selling prices) is a few basis points. In the same market three-, five- and 10-year bonds also trade on a daily basis but with much thinner volumes—thin to the extent that a million-dollar order can move yields by 25 to 50 basis points. And while 20- and 30-year bonds get auctioned at every bond auction, there is no liquidity at all in the secondary market for long bonds.

How do we fill in the gaps in the yield curve? The local association of treasury professionals, in collaboration with the central bank, banks and broker community, publishes a daily yield curve on an indicative basis that starts from overnight rates and ends at the 30-year bond. While this works and solves 80 percent of the issues, these rates are generally unstable for larger orders. If you want to buy or sell $10- to $20-million worth of longer maturity bond, there is a good chance that you will move the market significantly since the curve is indicative in nature and not based on trading data.

From a derivative pricing and valuation point of view this creates bigger problems since the notional business that you would write would ultimately need to be backed by some physical tangible bond. And if daily

liquidity in markets hovers around a million dollars, by definition your appetite for writing interest rate swaps, caps and floors is limited by the dollar amount you could safely hedge in the underlying security market.

These markets are relatively better markets because you have some data and a community-wide effort to fill in the blanks. There are other markets where there is no sovereign debt traded or issued per a regular schedule. No information is gathered or shared by the central bank on yield curves, auction participation, bid patterns and trends. There are no auctions, no indicative yields, volumes or visibility.

Imagine running an asset liability committee meeting without a firm market-based yield curve. From a transfer pricing point of view, the decisions you make on pool rates are estimates based on intuition and personal opinions. When the time comes to place or raise that deposit, will the market accept your intuition?

The good data problem is not just limited to fixed income securities. In market after market, from equities to commodities, the principal issue is trading volume and liquidity. Oil is another great example. The primary crude oil blends that you can trade and work with in terms of derivative products are WTI (on NYMEX) and Brent (on ICE). Clients in the Middle East and the Asia Pacific have exposure to Dubai Oman, Aramco, Iranian Heavy and Arab Light. While you can get price data on the underlying blends, exchange-traded contracts on the above blends either don't exist or have very limited volumes and participation. An alternate is to track correlations with WTI and Brent for each of the above blends, but the correlations are also not stable and can break down faster than you can unwind a position.

The graph below tracks the trailing correlation of the Saudi Arabia light with Brent. While the average trends between 60- to 90-percent, there are instances where correlations drop significantly at short notice and stay that way.

GOVERNANCE ISSUES

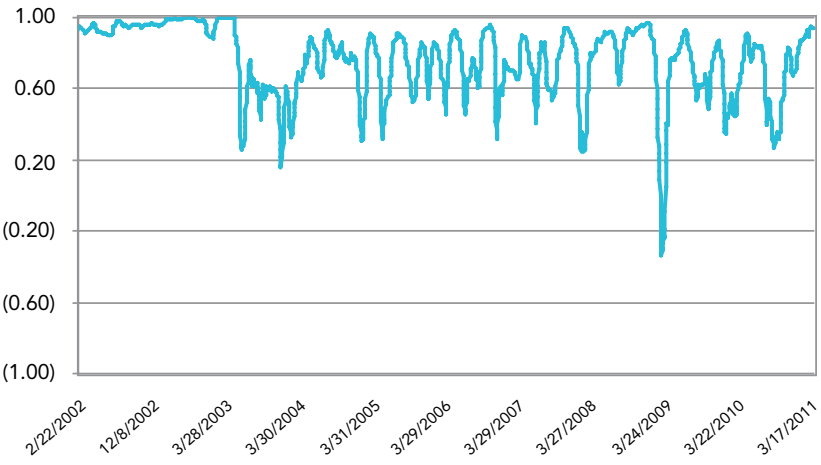
But perhaps the biggest issue, even bigger than data, is control at the board and management committee levels.

While matrix reporting is common in multi-national banks, most domestic banks in emerging markets still work with a linear reporting structure. In a matrix structure the country treasury reports to the regional treasury and the country risk group reports to the regional risk group. And while there is some administrative local reporting, incentives are aligned in such a fashion that the local country and business head has only limited influence on the local risk function.

In many emerging markets domestic banks are just that—domestic banks. Hence a linear reporting line that starts with the board, flows through the executive committee, at times the board risk committee, followed by the CEO or president, followed by business heads. The chief risk officer (CRO) and the risk management function at times report to the board and at times work with the president as their direct manager. The budget for the risk function and approval for its expenses and resources comes from the business side. And while the business side may not necessarily intend to sabotage or curtail the risk function, anything that does not contribute directly to business volume is simply overhead that needs to be reduced.

The problem with this approach is that to survive, the risk function learns to align its incentives with the business side. The alternate is isolation, replacement or substitution. Eight years ago, I used to advise clients thinking of escaping from the finance function to escape to risk. The work was different; the models were

Saudi Arabia – Light with Brent



CONTINUED ON **PAGE 38**

A Friendly Conversation: Emerging Markets | from Page 37

more exciting. Today I tell them to stay with the business side unless they are sponsored by a powerful board that will give them the teeth to do their job.

For instance, some of the most powerful CROs that I have worked with do not have the title of the CRO. They are CFOs and COOs with access to the board, and who, despite the inherent conflict, took the risk function under their protection and made it work.

In most linear reporting structures, the business side prevails and generally has a bigger stick or better credibility with the board compared to the risk function. It takes a very powerful and savvy board to create incentives that align correctly between the business side and the risk function. And while it is a challenge with matrix reporting, it is a much bigger challenge with linear reporting lines.

SO HOW DO WE WORK WITH ALL OF THESE IMPERFECTIONS?

The Control Function

Michael Lewis put it perfectly in The Big Short. The risk is not in price volatility. The risk is the stupid trade that never should have happened. While no control function can stand in the way of a determined trader to do the trade he wants to do, an effective control function can increase the threshold of determination required to break it and detect stupid trades when they get executed.

The first thing we focus on is the limits function and its ownership. If the limits function originates from risk, it will not work. The risk function cannot drive the car from the backseat.

The trading function has to own the limits mechanism and it has to participate in how they are defined, set and implemented. The limit mechanism is an immunization booster. Unless the patient takes the injection, it is useless.

The primary issue in these discussions is boundaries, damage control, face and blame shifting. Treasurers and traders don't like losing money or booking losses, and they dislike being hauled in front of the board or the management committee to explain the logic of every trade to someone who doesn't understand their markets or the trading function. And yes, the implementation of the risk function is also dependent on the composition of the board and professional experience of board risk committee members.

A well-balanced limits and control function focuses on detecting and avoiding the stupid trade which minimizes unnecessary face time with the board and eliminates witch hunts. It realizes that in the end the trade will kill the bank because of incentives and controls, not because of market or price volatility.

Education

How do you convince the trading function to own the limits and control mechanism or the board to put the right profile of professionals in the board risk committee? By educating key influencers.

We start off acknowledging the vulnerability of risk models, our dependence on inaccurate or indicative data, and the sensitivity of our models to market movements and assumptions. The objective is to build the right level of skepticism in our audience and highlight the importance of detecting, reporting and managing exceptions.

The reason why we put board members to sleep is because they can't follow the language and terminology of risk or see the relevance of our approach. Some of this gets fixed by sessions focused on walking them through notation and frameworks while the rest gets addressed by reviewing cases where their bank lost money or had a near miss and what the board can do to learn from its mistakes.

Qualifying Models

Qualifications on valuation and fair value opinions of vanilla as well as complex derivative transactions have become an important part of our work. Qualifications are important not just for limiting professional liability but also for acknowledging the elephant in the room, which is my model is broken and will only work in instances when markets do not misbehave. Qualifications become even more important in emerging markets when all we have is indicative data. Following is a

standard set that we use as part of our opinions.

a. Valuation models for such products vary in terms of approaches and the choice of assumptions can result in a broad range of valuation results.
b. Prices from such models are indicative in nature and may differ from market prices due to changing market, liquidity, interest and foreign exchange rates environment.
c. The indicative valuation is also based on a mark to market based approach and will differ from execution prices since it makes no adjustments for bid-offer spreads which will vary from one counterparty to another.
d. The valuation will change from one day to the next with changes in the underlying valuation parameters.

CONCLUSION

Since I started this article with a conversation, I think it would be appropriate to end it with another conversation.

This time though the city is Karachi, Pakistan, my home town; the year 2007. The bank is a small institution in turnaround mode being run by a president who himself had been a treasurer, supported by a CFO who had recently doubled as a CRO.

When the call came in for a proposal and a presentation we hardly expected it. When the sale happened and the implementation became one of our smoothest in history I asked the CFO how he justified the expense and resources associated with our risk platform. Where was the business case? I still remember the response he gave.

"One day this bank will recover and enter the markets again. We don't want to start building our risk capability when that day arrives. We want to build it now so that when we finally have capital to risk we also have the systems, the resources and the discipline to manage that risk. And if that means your system runs for a year waiting for our risk appetite to get back to normal, so be it." ■

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