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Ten Risk Management Trends That Will Define the Future of ALM

The future for risk and asset/liability management (ALM) is bright. In light of Sarbanes-Oxley, Basel II, and continued governance disasters, most recently in the mutual fund and insurance industries, risk and ALM should remain a front burner issue for many years to come. On the best-practice front, leading financial institutions have reported significant benefits in terms of risk-adjusted profitability. In recognition of their value added, ALM professionals are moving up in the financial institutions industry world in terms of organizational level and compensation.

Moreover, advances in risk methodologies and technologies are introducing a vast array of new tools for measuring and managing enterprise-wide risks at a higher speed and lower cost than anyone could have imagined just a few years ago. Although there are many remaining challenges, one cannot help but think that the best is yet to come for the risk management profession. That being said, I would like to predict some important changes in this field over the next decade.

❑ *Enterprise Risk Management (ERM) will become the industry standard for risk management. BALM* introduced ERM in my September 2004 article. I believe that ERM will continue to gain acceptance as the best way to ensure that a financial institution's internal and external resources work efficiently and effectively in optimizing the organization's risk/return profile. New financial disasters will continue to highlight the pitfalls of the traditional *silo* approach to risk management. External stakeholders will continue to hold the board of directors and executive management responsible for risk oversight. More importantly, leaders in ERM will continue to produce more consistent business results over various economic cycles while weathering market stresses better than their competitors. These trends, coupled with a stock market that is increasingly unforgiving of negative earnings surprises, will compel financial institutions to adopt a much more integrated approach to measuring and managing enterprise-wide risks.

❑ *The position of Chief Risk Officer (CRO) will become prevalent in risk-intensive businesses.* The rise of the CRO will coincide with the growing trend toward ERM. Risk management will become a key driver of success for financial institutions, as well as non-financial corporations with significant risk exposures. Many market leaders in these industries have already created the position of CRO. Companies without a CRO are faced with three perplexing questions, including the following:

Also in This Issue:

- Are we comfortable with our currently diffused risk responsibilities and, if not, who is the de facto CRO, the CEO or the CFO?
- Are our current part-time efforts sufficient in managing risk in an increasingly volatile business environment?
- Will the company be able to attract and retain high-caliber risk professionals if a CRO career track is not available for them?

For a number of companies, the logical resolution to these questions will be the appointment of a CRO and the dedication of resources to implement an ERM program.

❑ *Audit committees will evolve into risk committees.* As boards of directors recognize that they have responsibilities to ensure that appropriate risk management resources are in place, they will replace or supplement their audit and ALCO committees with risk committees. A number of leading institutions have already established risk committees of the board. The board's responsibilities for risk management have been clearly established in regulatory and industry initiatives worldwide, including the Treadway Commission Report within the United States. The result of these and other similar initiatives is that boards of directors have begun to realize that their responsibilities go far beyond traditional audit and ALM activities, and that they need to ensure that resources and controls are in place for an expanded array of risk. Going forward, financial institutions will establish risk committees of the board, and their audit and asset/liability management committees (ALCOs) will maintain the traditional focus of ensuring accurate financial reporting and interest rate risk management.

❑ *Economic capital will be in; VaR will be out.* Managers and external stakeholders will demand a standardized unit of risk measurement, or common currency, for all types of risk. It is in this way that they will be able to spot trends in the bank's risk profile, as well as compare the risk/return performance of their organization against others. To date, value-at-risk (VaR) has gained wide acceptance as a standardized measure for market risk. However, VaR has three major flaws. First, it does not capture *tail risks* due to exposure to highly infrequent, but potentially devastating, events. Second, its inability to capture tail risks makes VaR a poor measure for credit and operational risks, as well as market risk positions with significant optionality. Third, VaR measures the *risk*, not the *return*, of any risk position. Yet financial models that have passed the test of time, such as the *Capital Asset Pricing Model* or the *Black-Scholes Option Pricing Model*, evaluate both risk *and* return. The concept of economic capital is intuitively appealing because one of the main reasons financial institutions hold capital is to absorb potential losses from various types of risk. Risk-adjusted return on capital extends this concept and measures business profitability on a risk-adjusted basis. The Basel Committee has already adopted economic capital as the framework for international regulatory capital requirements in the banking industry. Other industries are sure to follow suit in adopting it as a common currency for risk.

❑ *Risk transfer will be executed at the enterprise level.* The integration of risk transfer activities has already happened as far as hedging strategies are concerned. For example, financial institutions that hedge with derivatives realize that they can save on hedging costs if they execute portfolio hedges rather than individual securities hedges. Alternative risk transfer (ART) goes one step farther by combining capital markets and insurance techniques. The rise of ERM and ART products will mean that future risk transfer strategies will be increasingly formulated and executed at the enterprise level. In the past, many banking organizations made risk transfer decisions to control specific risks within a defined range, without being particularly thoughtful about the cost of risk transfer unless it was prohibitively high. In the future, I believe that financial institutions will make risk transfer decisions based on an explicit comparison between the cost of risk retention versus the cost of risk transfer, and execute only those transactions that increase shareholder value.

❑ *Advanced technology will have a profound impact on risk management.* The Internet will have a significant impact on risk management and how information, analytics, and risk transfer products are distributed. Moreover, the increase in computing speed and the decline in data storage costs will provide mid-sized institutions access to sophisticated risk models that were once the privilege of only the largest banks. Additionally, the time interval for enterprise-wide risk measurement and reporting will move from monthly to weekly and ultimately to daily/real-time. Moreover, the further development and expanded use of wireless and handheld communication devices will enable the instantaneous escalation of critical risk events while allowing bank A/L managers to respond immediately to emerging problems or new opportunities. In the past, the application of technology was focused on risk *quantification* in terms of analytical interest rate risk models. In the future, the application of technology will be focused on risk *communication* in the form of an ERM dashboard.

❑ *A measurement standard will emerge for operational risk.* Today, there is considerable debate not only about the quantification of operational risk, but also how to best define it. Approaches to assessing operational risk range from qualitative assessment of probability and severity based on management judgment, to quantitative estimate of potential loss based on industry and organizational loss histories. The lack of consistent operational loss data,

partially as a function of the infrequency of major operational risk events, has led to the development of analytical models, such as *Extreme Value Theory,* to come up with loss estimates. Other models borrow from total quality management techniques or dynamic simulations to quantify operational risk. More recently, there has been some support, and some encouraging results, from early experimentation with neural networks to recognize patterns in operational risk. As the practice of operational risk management gains acceptance within the financial institutions industry, and as data resources become more available as a result of industry initiatives, a measurement standard will emerge for operational risk. However, the greatest challenge for operational risk will remain one of management, not measurement.

❑ *Mark-to-market accounting will be the basis of financial reporting.* Over time, the risk management profession has recognized the importance of mark-to-market accounting versus accrual accounting in reporting the financial condition of the bank. Although accrual accounting is adequate in reporting the value of physical assets, it can provide the wrong signals in reporting financial and other intangible assets. The use of mark-to-market accounting is widely accepted in the market risk field and is gaining acceptance in the credit risk arena, where credit-based assets are marked-to-market given their probability of default (e.g., credit ratings or credit spreads). Given the demand for greater risk transparency from shareholders and regulators, it is likely that variability (i.e., risk sensitivity) will be much more integrated into financial reporting in the future. This growing trend will ultimately include the full use of mark-to-market accounting for all financial assets.

❑ *Risk education will be a part of corporate training and college finance programs.* As the financial institutions industry begins to recognize the need to train and develop their risk management staff, corporate training programs will increasingly feature expanded risk management beyond today's credit and interest rate risk programs. These training programs will likely be a combination of internal and external resources including internal workshops, external conferences, and Internet-based training tools. Given the rising corporate demand for skilled risk and ALM professionals, professional organizations and colleges will continue to integrate risk management into their course offerings. Professional certification and college degree programs will gain popularity and acceptance. Similar to the development of the Chartered Financial Analyst (CFA) certification in finance and investments over the past decade, a widely accepted professional certification in risk management will emerge in the next decade. Finally, colleges will expand their course offerings beyond derivative products and credit analysis by offering courses in ERM, risk management applications, and integrated risk transfer.

❑ *The salary gap among risk professionals will continue to widen.* The trend toward ERM and the appointment of CROs has created an exciting career path while providing attractive compensation opportunities for risk professionals. However, this new career path will only be available to risk professionals who continue to develop new skills and gain new experiences, while the others will be left behind. The salary gap that has developed over the past several years will continue to widen over the next decade. On the one hand, the compensation for risk and ALM professionals with cross-functional skills will increase faster than other professions because of rising demand for their services. On the other hand, ALM professionals with narrow skills or who serve limited focused roles will not enjoy above-average compensation and may, in fact, see their job security decline as their jobs become less relevant in the new world of risk management.

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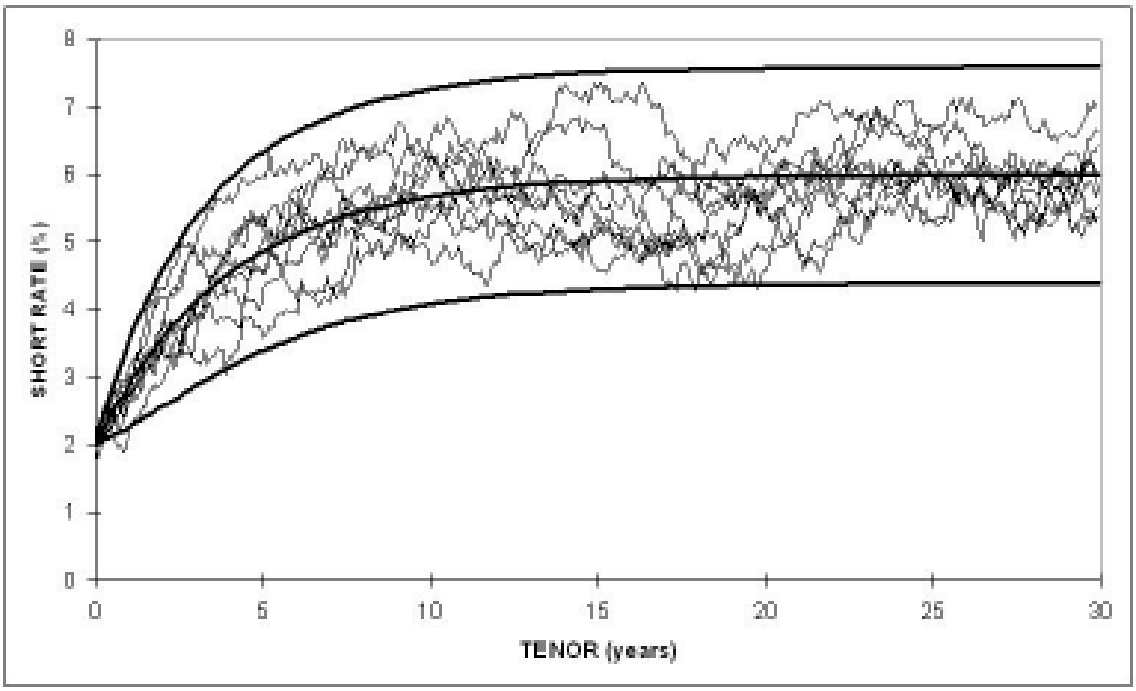
A Simple Technique to Visualize the Properties of Stochastic Interest Rates

An increasing number of banks and other financial institutions are using stochastically generated interest rates to measure interest rate risk and to value financial assets and derivatives with complex embedded options, such as prepayments and path-dependent caps and floors. The use of stochastic interest rates for these problems is both appropriate—given the stochastic nature of interest rates—and increasingly mandated by regulators at the larger more complex financial institutions. However, the lingua franca of stochastic interest rate generation is stochastic calculus, which, while popular in graduate financial engineering and financial economics, is a highly specialized field and not part of the usual background of an asset/liability (A/L) manager or A/L management committee (ALCO) member. This can create a disconnect between the users of the risk results generated using stochastic-simulation-based A/L management (ALM) software and the assumptions that underlie the generation of stochastic interest rates. Unaware users may be measuring risk using sophisticated, mathematically consistent algorithms that may not be reasonable. In this article we present a simple method for visually inspecting the properties of stochastic interest rates generated by a typical Monte-Carlo rate generator. This method can be implemented into a spreadsheet and provides decision makers with a straightforward way of assessing the reasonableness of the stochastic interest rates that lie at the heart of much of their risk measurement.

EXHIBIT 1.



Calibrated and Unreasonable? It may strike some as odd that stochastic interest rates generated by a properly calibrated ALM model would be unreasonable. It is nevertheless true, and it is the direct consequence of the mathematical basis for many popular stochastic interest rate models (particularly the so-called one-factor models). The assumptions necessary to make them analytically tractable have little to do with how interest rates actually move. Given enough free parameters—and they do have enough—these models can be made to reproduce the observed prices of securities, but the common assumption that this implies a reasonable set of stochastic interest rate scenarios can be an illusion.

Fortunately, the results of stochastic interest rate models used to measure interest rate risk have a common structure, which allows the construction of a visualization tool to assess the reasonableness of stochastic interest rates regardless of the model used to generate the rates. We begin with a brief overview of the stochastic interest rate models and focus on how they are represented and the basis for their common structure. We then walk through the construction of the visualization tool in a spreadsheet format and show how this can illuminate a number of properties of stochastic interest rates that bear directly on asset liability management.

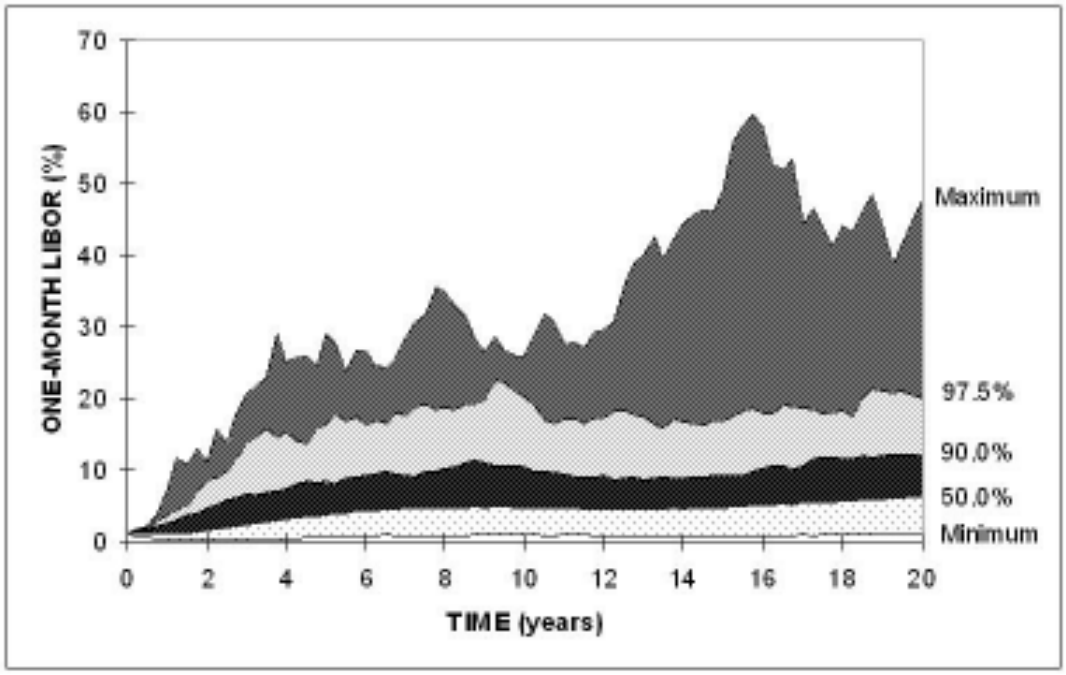
Representations of Stochastic Interest Rates. Stochastic interest rates can be expressed in a number of equivalent ways, each of which have an advantage in a particular circumstance and each of which are popular in a given field of research. In the world of financial engineering and financial economics, the representation of choice is the stochastic differential equation (SDE):

$$dr(t) = a[r(t),t]dt + b[r(t),t]dW(t)$$

The above equation states that the change in the interest rate, dr(t), is equal to some function, a[r(t),t], times the change in time, dt, plus another function, b[r(t),t], times a source of randomness, dW(t). Because an equation of this type is the core of all ALM software that uses stochastic interest rates (e.g. Monte Carlo and lattice), it is this equation or, to be more precise, the output of this equation that we need to be able to assess. Much of financial mathematics deals with the solution of this equation for different versions of a[r(t),t] and b[r(t),t]. And this is where stochastic calculus comes in: specifying solutions requires an understanding of the math. However, just because the math is right doesn't mean the results are reasonable.

Graphical representations of mathematical functions enable the communication of information without the need

EXHIBIT 2.



to solve the functions, and this is the nature of the solution that we propose. An example of this principle in action is illustrated in Exhibit 1, where we show a sample set of 10 stochastic interest rate solutions, or paths, generated by solving numerically the SDE for a mean-reverting normal model of the short rate together with the mean short rate and the ranges defined by twice the variance about this mean. The curves, or contours, determined by these summary statistics illustrate clearly the central features of this interest-rate process:

- The interest rates are all positive;
- The short rate is currently at 2 percent, and expected to rise to 6 percent over the next 10 years; and
- The probability of interest rates above 10 percent is rather low.

As the number of paths increases from the 10 shown in Exhibit 1 to the multitudes needed for accurate Monte-Carlo valuation and risk measurement, graphs of the individual paths become something of a muddle, and a contour plot becomes a clearer way of visualizing features of the interest rate process.

In creating Exhibit 1 we had the advantage of dealing with an SDE for which the mean and other moments of the distribution are known. We know how to create a contour plot for the situation commonly encountered in ALM where the rate distribution statistics are either not known or easily available.

Contour Plots of Stochastic Interest Rate Paths. As discussed above, the results of stochastic interest rate models that are used by banks and other financial institutions to measure interest rate risk have a common structure. They are a collection of interest rate paths that represent a distribution of how rates may evolve, given the market's view of cash and derivatives prices. For any given rate we can represent that view as a two-dimensional matrix defined by path, or scenario, and time. When we expand the matrix to include multiple rates (e.g., fed funds, 3-month LIBOR, 10-year Treasury, etc.) we have a third dimension. In other words, all stochastic interest rate generators result in an interest rate cube. This common structure is independent of the complexity of the SDE used to generate the rates and makes the visualization tool we now discuss remarkably versatile.

To create a contour plot for an arbitrary interest rate process, we begin with the interest-rate matrix, with each row of the matrix containing an interest-rate path and each column representing a point in time. Since each column represents a sampling of the distribution of rates at that point in time, we can use the percentile function in a

spreadsheet to generate the summary statistics for each column—or point in time—in a given interest-rate matrix. The result of each percentile analysis as a function of time defines a contour for that percentile as a function of time. Doing this for each column creates a set of curves not unlike those shown in Exhibit 1. Carrying out this procedure on the one-month LIBOR output from a commercial stochastic generator for the collection of percentiles (0, 50, 90, 97.5, and 100) gave us the results shown in Exhibit 2 on page 5. Casual inspection of Exhibit 2 indicates clearly that this interest rate process can generate some breathtakingly high levels of the one-month LIBOR rate and that a substantial portion (roughly 2.5 percent) is at or above 10 percent about five years into the future. These high rates are even more remarkable as the rate process used to generate them was calibrated to observe cash and derivatives prices: a clear demonstration of our earlier comment that a calibrated process does not necessarily imply a reasonable distribution of stochastic interest rates.

Discussion and Summary. Stochastic interest rates are becoming a more common tool in the measurement of interest rate risk. This represents an improvement in risk measurement technique because interest rates are inherently stochastic and bank products are filled with embedded options that can only be valued accurately using stochastic interest rates. Better measurement of interest rate risk will continue to embrace this feature. Unfortunately, many models of stochastic interest rates were developed to show how fixed-income derivatives would be priced if interest rates behaved a certain way, not because interest rates were shown to behave a certain way. Consequently, very complex interest rate models can both reproduce observed security prices and still generate an unreasonable distribution of interest rates that may not be appropriate for guiding risk management decisions. This means that general and accessible methods for assessing the reasonableness of generated interest rates are needed by the ALM community.

In this article we have introduced a method that we have found very useful for visually assessing the reasonableness of the rates generated by a stochastic interest rate process. It can be applied to the results of any stochastic interest-rate generator and rendered in any spreadsheet. As such it can be easily applied in any interest rate risk measurement context with existing tools resident at every financial institution.

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Annual Compensation Surveys—Why Bother?

Are you paying too much or too little to maintain your asset/liability management (AML) staff? Are you, as an ALM professional, earning what you're worth? Are your pay increases adequate? Is your incentive compensation plan paying out, or is it a static non-payer? As an employer, are you expanding opportunity levels for your A/L staff? Are you attracting *and* retaining the highest quality employees?

Whether employer or employee, it is important to know what other companies are paying in total compensation for similar positions in your area. It is for just this reason that the annual *BALM* Compensation Survey is an important factor in assessing competitive compensation levels for bank ALM professionals and worth the time it takes to complete and return the annual salary survey form.

Learn how your position compares in the area of salary and bonus. This annual compensation survey provides valuable data that can assist you in making informed compensation and hiring decisions. We present up-to-date results that you can use with confidence in your annual salary planning process.

Moreover, the annual *BALM* Compensation Survey has, over the years, proven to be a reliable source for competitive ALM compensation rates by geographic area, financial institution size, industry experience levels, complexity of responsibilities, and educational background.

Compensation Planning. The importance of this vital business planning tool provides many participating organizations with the following benefits:

- Assisting the bank's ALCO and top executives with valuable industry data in determining a competitive salary structure;

- Assisting with the budget-planning process;
- Aiding in the design, implementation, and management of an effective variable compensation plan;
- Formulating a strategic direction for your compensation program that will complement and enhance bank management's ability to achieve their stated ALM compensation objectives;
- Serving as a foundation for developing new salary programs;
- Helping both employee and employer to gain confidence in the foundation upon which the overall compensation plan is established;
- Helping your institution to remain competitive while minimizing the risk of losing employees to other financial institutions;
- Facilitating staff planning and organizational development;
- Enhancing your ALM recruiting programs; and
- Providing a decision-making foundation for the purchase of asset/liability management modeling software.

Annual Incentive Plans. Moreover, the annual *BALM* Compensation Survey can assist your management in evaluating existing incentive plans and modifying or designing new goal-attainment incentive programs tied to measurable financial and operational objectives. The annual *BALM* Compensation Survey results encourage effective overall incentive planning while providing information for sound managerial decision making.

Finally, properly constructed compensation programs can assist your financial institution in optimizing the use of its human resource pool while achieving key business objectives. A solid, comprehensive compensation program can allow your organization to grow and profit through the use of highly motivational, cost-effective incentive compensation programs.

Summary. As an employer, the factors mentioned above are of vital importance in the successful operation of your financial institution. As an employee, you will want to know if your salary and bonus are competitive within the U.S. banking community.

It takes but a few minutes to complete the data input form. For a thorough and informative analysis of 2004 compensation, complete and return the enclosed survey form and return it to Southeast Consulting, Inc. directly or through our Web site. The results will be published in the May 2005 issue of *Bank Asset/Liability Management*. Be a part of this important survey by helping us collect a representative sample of national and regional ALM compensation practices.

MARY BROOKHART
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