

BOOK REVIEWS

Risk Management, Michel Crouhy, Dan Galai, and Robert Mark, 2001, New York: McGraw-Hill

Reviewers: H  la Dahlen and Georges Dionne, Risk Management Chair, HEC Montr  al

Risk Management offers comprehensive coverage of the design and operation of a risk management system: its technical modeling and its interplay with the external regulations by which such a system is governed. More specifically, it provides a framework for viewing the policies, methodologies, data collection, and technical infrastructure used to support risk management. The book discusses investment, hedging, and management strategies. It focuses attention on the measurement of market, credit, and operational risks as integrated in a multiperiod market model as well as on liquidity risk and other long-term, horizon-risk management policies. The book looks at the role of the risk manager, often a key member of the senior executive team in any firm where risk is a key factor affecting corporate value, such as in banks and other financial and nonfinancial organizations. In this book, the authors provide the product of their academic research and their practical work in the field.

The first four chapters introduce the purpose and role of risk management: the place it holds in the institution and how the system itself is managed, particularly with regard to its regulation and its extensive internal role in guiding and meeting the requirements of the institution's external overseers. Chapter 1 treats the need for risk-management systems in financial institutions, while Chapter 2 covers the current international regulations governing banks. In Chapter 1, the authors point out that banks are increasingly engaged in what might be called "risk-shifting" activities. These activities continue to raise the ante for expertise and know-how in controlling and pricing the assets that banks manage in the marketplace (p. 2). As derivatives are the essential instrument of risk shifting, banks now practice not only capital intermediation but also risk intermediation. Chapter 1 also presents an interesting historical review of the evolution of various derivative products in different markets since their introduction in 1972.

Chapter 2 offers a good description of the foundation and historical evolution of the regulatory environment in which banks currently operate, stressing in particular the links with deposit insurance. As we shall see Chapter 4 analyzes current regulations for market risk in detail because we come back to this later. And Chapter 1 reviews the basis of portfolio management, a concept that will be revisited in many chapters of the book. The authors are particularly strong advocates of the need to develop a portfolio-management approach to credit risk to obtain an accurate diversification of this risk and help different institutions develop adequate overall credit-risk strategies for setting optimal capital requirements. The last part of Chapter 2 provides a critical

review of the current regulatory environment and analyzes the different proposals for the next Bank of International Settlements (BIS) accord, now scheduled for 2005.

Chapter 3 is concerned with a framework for best practices in risk management, while Chapter 4 reviews, in detail, the current BIS capital requirement for market-risk management and compares standardized models to the internal models that banks can use for reporting regulatory capital. Institutions often fail to structure and supervise risk management even though this is fundamental to obtaining the desired results. The fact that two of its authors have experience in banking is a plus for the book. They detail how risk management is organized in a financial institution, with special emphasis on those authorized to control risk in the organization. According to the authors, everyone in the firm must understand the roles and responsibilities related to risk management, including its links with senior management, trading-room management, and operations. Two elements crucial to an efficient risk-management system are the process for delegating authority and the structure for monitoring risk. The chapter also analyzes the audit's currently popular role. Finally, the authors show how to establish risk limits and how to manage liquidity risk, another popular subject since the Long Term Capital Management (LTCM) "default" in 1998.

Chapter 4 compares a bank's internal risk-management system to the standardized approach of the Basle regulation. Since 1998, banks have been free to choose either of these two approaches to market-risk management, although they are still obliged to follow the Basle regulation for credit risk. The message of the chapter is that well-diversified banks have a strong advantage in using internal models that let them set their capital requirements in direct relationship with the optimal economic capital corresponding to their true portfolio risk. In point of fact, the standardized approach yields a much higher capital charge for general market risk than the internal VaR (Value-at-Risk) model when the portfolio is well diversified.

Chapters 5 and 6 analyze the measurement of market risk in detail, with particular emphasis on the VaR approach. They also cover stress testing and scenario analyses. The chapters analyze variants of the standard market-risk VaR related to the normal distribution assumption—such as incremental-VaR, delta-VaR, dynamic VaR, and E-VaR—along with examples. They also devote space to errors in measurement and the back-testing of the models. These two chapters study equity-price risk, interest-rate risk, foreign-exchange risk, and commodity-price risk in detail in portfolios containing linear and nonlinear derivatives. They review Greek risk measurements for portfolios containing options as well as their weaknesses. They also compare parametric and nonparametric VaRs for different time horizons and discuss Monte Carlo simulations for estimating VaR. Chapter 6 overviews the different extensions of the standard VaR approach and covers the testing of the different models.

A large part of the book (Chapters 7 through 12) is devoted to credit-risk management. The authors present in detail and evaluate the major competing models for measuring and valuing credit risk. They cover credit-risk rating and migration, credit-risk measurement, and portfolio credit-risk management. The regulation of credit risk is still elementary and quite arbitrary. As a result, the capital-risk requirement regulated may often differ from banks' optimal economic capital risk. This may be one of the factors that has prompted banks to move into securitization activities designed to maintain the capital they require by selling low-risk assets and holding high-risk

ones to increase their profits. It should be mentioned that, under current regulations, banks are obliged to maintain much higher capital reserves for many good-risk private corporations than those required for many government bonds. Moreover, the same percentage must be used for all private firms, whatever their rating. These rules were supposed to be revised in 2002, but the revision was postponed for lack of agreement among the different parties, including the major banks. This lack of agreement may be partially explained by the operational risk discussed in Chapter 13.

We must also mention that these chapters on credit risk are backed up by numerous appendixes covering many technical developments not found in similar books. For example, two appendixes to Chapter 8 present the Elements of Merton's model as well as the Default Prediction-Econometric Model, whereas two appendixes to Chapter 9 discuss the Integrating Yield Spread with Options and Risk-Neutral Valuation Using "Risk-Neutral" EDFs (Expected Default Frequency). Many of the book's other chapters also contain very useful appendixes.

Chapter 7 is devoted to the description of credit-risk systems. It describes internal and external risk-rating methods (those of agencies such as Moody's and Standard & Poor's) in detail, including those used to rate debt and the migration of credit risk. Chapter 8 describes the CreditMetrics model. It shows how to calculate the credit VaR and the corresponding capital requirement for a portfolio of bonds, taking into account the credit-risk correlations between the different bonds in the portfolio. The authors also discuss the usefulness of having conditional default probabilities and conditional transition probabilities that would take different macroeconomic factors into account. This part of the research is not well developed in the literature because the actual data sets do not cover enough years to take the different credit cycles into account. The recovery rates in case of default are not very well documented in this literature. CreditMetrics, for example, uses the maturity of the debt as a basic model, but this seems insufficient, particularly when the macroeconomic cycles are again considered. Recovery rates should at least be a function of interest rates.

Chapter 9 covers a competing approach in the market: the contingent claim approach. The major difference between the two approaches is related to the data used to estimate the ratings for transition probabilities. In the CreditMetrics approach, the information comes from the historical frequencies of default and credit migration. Two crucial assumptions are made in this approach: (1) all firms in a given credit class have the same probabilities of default and transition, and (2) the actual default rate is equal to the average historical default rate without any weight for the more recent record. KMV has developed an alternative to the credit-migration approach based on the structural model developed by Merton, where the economic value of default is presented as a put option on the value of the firm's assets. Each firm can thus be analyzed separately when the data are available. The authors develop the model and show how to estimate the credit risk of a firm by using its equity value to approximate its assets. Correlations between the returns on assets are useful for estimating the correlations between default probabilities and for computing the credit VaR of an entire portfolio.

Chapter 10 is devoted to two other models used in the market: the Actuarial (or Credit+) Model and the Reduced Form Model. Chapter 11 compares the different models with real data. The authors obtain that, when the parameters are correctly harmonized, one can observe few differences in the results. But they also show that

"the differences between the models become more important, in relative terms, at higher (percentage) loss levels" (p. 430). Finally, they recommend that banks should rely on their internal rating system for their middle-market portfolio, since small private firms cannot be directly compared to large public firms.

Chapter 12 looks at the hedging of credit risk, which is, of course, another form of protection and a way of reducing capital requirement as well as of collateralizing debt or netting positions. It emphasizes credit swaps. Chapter 13 introduces operational risk, and Chapter 14 focuses on capital allocation among different activities or departments. The authors explain how to develop operational risk control and measurement and how to implement the risk-adjusted return on capital (RAROC) model to measure performance and allocate economic capital. Chapter 15 is concerned with model risk.

Although it may represent a significant share of a bank's total risk, operational risk is a quite new subject for the Basle Committee. According to the authors, total risk can be divided into three main categories: 70 percent for credit risk, 10 percent for market risk, and 20 percent for operational risk. Moreover, since market and credit risks will be more diversified in the short run, operational risk may become more significant in relative terms. The major problem with operational risk is that its definition is quite vague in the financial literature and even in the Basle documents. So it is difficult to impose a rule or a method that will fix the capital requirement for regulation.

Chapter 13 is a very good introduction to operational risk even though it does not present the technical models to measure it. This stands in sharp contrast to the chapters on market and credit risks. In fact, the authors present the framework developed at Canadian Imperial Bank of Commerce (CIBC) to control this risk. Operational risk is related to the risk of operating a business. It includes the risk of computer breakdown, a bug in the software, errors of judgment, fraud, and so on. It is interesting to observe here that unlike market and credit risk, operational risk is more subject to moral hazard. So if a bank covers this risk, it must also introduce the appropriate incentives to reduce this potential behavioral problem to a minimum. The same comment applies if the institution chooses to transfer this risk to outside risk-takers such as insurers.

The authors separate operational risk into two major components: risk of operational failure (internal to the firm) and strategic operational risk (external to the firm). The first is related to any failure in the course of operating the business, whereas the second arises from environmental factors beyond the firm's control, such as a change in regulation or competition, an earthquake, or even a new political regime. The authors limit their analysis to the operational failure component and divide the severity of this risk into two categories: expected and unexpected. As for the management of other types of risk, they insist that success in controlling them will depend on how well the firm coordinates its business infrastructure with internal auditing and risk management. They devote a long section of the chapter to showing how this coordination can be developed. The main objective is to develop ways of measuring this risk, which would involve computing an operational-risk VaR for optimal capital requirement, implementing stress testing procedures, and allocating capital according to the results.

One major problem with operational risk is the lack of accurate data, particularly for large losses. One possibility discussed in the literature is to transfer the catastrophic portion to external risk-takers such as insurers and reinsurers. But, as mentioned

before, this risk is subject to moral hazard, and it is not clear that the insurance market will take it over at a low price without clear incentive schemes and strong transparency in management and auditing. Since all the data needed are not available in the short run, the authors suggest that a meaningful part of the exercise should be devoted to setting qualitative measurements for some of these risks. The authors are confident that the banking industry will develop internal models for managing operational risk comparable to those now used for market and credit risks and that the BIS will be more willing to take these models into account when setting the regulated required capital.

Capital allocation is very important for banks, as it is for any other financial institution. The authors focus their attention on the RAROC methodology and present it as “a critical component of the integrated risk management framework” (p. 529). The RAROC analysis can in fact be used to determine how much capital is required in each business line. It is also a good instrument for managers who need to make a fair tradeoff between risk and return. The definition of “capital” is important for the application of the RAROC methodology.

Once again, the authors take the time to distinguish economic capital from regulated capital. Economic capital is designed to “absorb unexpected losses, up to a certain level of confidence,” which is usually between 95 and 99 percent because it would be too costly to operate at 100 percent (p. 531). Regulatory capital is derived from a set of rules issued by a regulatory agency or, in the case of banks, by the BIS. The two definitions may not coincide because the rules may not take account of the different parameters required to obtain the optimal level of capital needed in a given institution, such as the correlations between the different risks in the portfolio or the average empirical credit risk of a group of public or private institutions.

It is of course the economic definition that matters for financial institutions, provided their internal models are adequate or free of significant model risks, a subject to which we return when examining Chapter 15. We know that since 1998, banks have been allowed to use their internal model for computing their level of regulatory capital for market risk, and this is a first step in reducing the gap between the two definitions. However, this internal use is subject to the regulated conditions already discussed in Chapter 4.

The authors next show how to apply the RAROC methodology to the three major risks—market, credit, and operational—and propose an integrated capital management process. A prerequisite for the use of such management tools is to obtain the collaboration of all decision levels in developing an efficient risk-management information system. The remainder of the chapter shows how to implement a RAROC model and how to measure risk-adjusted performance by applying what the authors call a second-generation RAROC model that takes into account regulatory constraints.

Model risk is a very important chapter for institutions that plan to use internal models. Many institutions lose money because their internal models have not been adequately implemented, particularly with regard to settings for different complex financial products. Chapter 15 discusses some classic examples and well documents their sources of errors, as well as the different theoretical sources of model risk.

In Chapter 16, the authors turn their attention to the risk management of nonbanking corporations. The authors review the determinants for risk management and the

procedure for risk management, related in most part to accounting issues, a subject that seems to have been neglected by different regulatory authorities over recent years.

The book ends with a look at the future of risk management, affording the authors the opportunity to return to their favorite topic: the integration of risk management.

We very much enjoyed reading this book. It covers all the aspects of risk management with which banks must deal with great competence. Many of the chapters are also very useful for other financial institutions. The book reflects the strong academic and practical competence of its team of authors. The detailed treatment of both credit and operational risk is still relevant, and the emphasis placed on risk control and auditing is timely in light of recent events.

Some expansions would be welcome for the third printing. More detailed analyses of the empirical issues involved in the risk-management needs of nonbanking firms should be included. The regulation of capital has motivated the development of strong risk-management teams in banks. One factor of this motivation was that arbitrary rules for setting regulated capital has forced banks into the costly practice of holding large and inadequately justified reserves. These issues are still on the table for credit risk and operational risk, and (at least for the latter) it seems unlikely that they will be resolved before 2005. These issues are a less intense concern for nonbanking institutions, and it would be interesting to have a longer discussion on what distinguishes other financial firms or funds from banks.

Empirical analyses of the reasons motivating nonfinancial firms to implement risk management systems are now available in academic journals, and they would be a welcome complement to Chapter 16.

Another topic not covered is the securitization activity of the banks and its role in risk management. It would be interesting to know the links between optimal capital, the intensity of securitization activity, and the banks' overall risk.

The first two printings of the book contain many typos and errors in the tables. We report a list at the following address: <http://www.hec.ca/gestiondesrisques/02-03.pdf>. The authors should see that they are corrected in the third printing.

We recommend the book to all academics and professionals and also encourage its use in graduate courses in risk management. But please wait for the third printing, which should be available soon.

Planning for Retirement Needs, 5th ed., David A. Littell and Kenn Beam Tacchino, 2001, Bryn Mawr, Pa.: The American College

Reviewer: Karen L. Hamilton, Appalachian State University, Boone, N.C.

This book is used by The American College in its retirement planning course, which is one of the requirements for obtaining the Chartered Life Underwriter (CLU) or Chartered Financial Consultant (ChFC) designations. The authors are both associated with The American College. Littell is a professor of taxation at The American College. Beam serves as a consultant to The American College and is a professor of taxation at Widener University. Both authors are lawyers with experience in retirement and pension planning.

