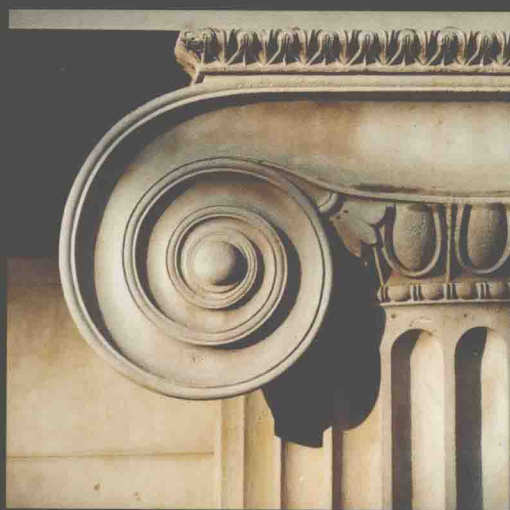


RISK MANAGEMENT IN BANKING

≈ THIRD EDITION ≈



JOËL BESSIS

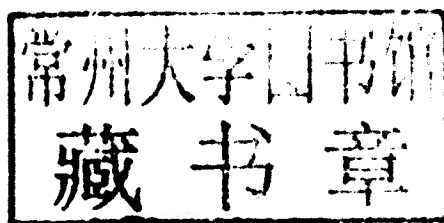
RISK

MANAGEMENT

IN **B**ANKING

THIRD EDITION

Joël Bessis



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About the Author

Joël Bessis is Professor of Finance at HEC, the leading French business school, where he conducts training in risk management throughout Europe, the US and Asia. Over the course of his career Joël has developed a dual expertise – as an academic and as a practitioner, holding permanent consulting assignments in corporations and later, in banks. Joël worked for over fifteen years in risk management departments of financial institutions – as a consultant to the risk departments of several banking institutions in Europe, including the Banque Paribas and the European Bank for Development (EIB). Joël took a leave of absence from HEC Paris between 2000 and 2005 where he held positions as Director of Research at Fitch, and Head of Risk Analytics and Model Validation in the Risk Department of IXIS, a Paris based investment bank. Joël graduated as an Engineer from École Centrale in Paris, before earning a Masters in Business Administration from Columbia University in New York, and a PhD in Finance from the Université Paris-Dauphine. As an academic, Joël has published various papers and books in the fields of corporate finance, industrial economics, and financial markets.

Introduction

Risk management in banks became “the” hot topic after the 2008 financial crisis. The crisis appears as the most important one in the modern period. It is systemic in nature, in that it involves the entire financial system, from capital markets, to banks, funds and insurance companies, and all financial firms. Addressing risk management in this context is challenging given that the magnitude of the crisis suggests that risk management was inefficient, that risk models were inadequate and that regulations failed to meet their goal of avoiding a major crisis. Indeed, it is ironic that the crisis started when the new Basel 2 regulations were enforced in Europe.

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I BASIC POSTULATES OF THIS TEXT

This book does not address the financial crisis directly, but does not bypass it either. The very first chapter addresses the issue of “what went wrong” in the development of the crisis, starting from the 2007 so-called “sub-prime” crisis and culminating in 2008 into an unprecedented halt of the financial system, a system that was precisely under regulations aiming at avoiding such systemic crisis.

1.1 The Financial Crisis

Some simple facts deserve to be mentioned as a starting point. Criticisms of financial firms, of regulators and regulations, of rating agencies, of governance practices, of short-sighted appetite for profitability, of improper behavior of supervising authorities, of risk models, became commonplace and are seen as major causes of the 2008 crisis. Even financial models, which are supposed to have scientific foundations, are widely blamed today, perhaps because they have been pushed too far, for example by plugging in unreliable data.

In the end, the development of the crisis, as explained in the very first chapter of this text, refers to simple mechanisms that could have been anticipated, some of them being well-known and others resulting from relatively simple adverse effects that were not beyond common sense, but emerged through interactions of new regulations. Presumably critics are right in explaining the crisis by such factors.

This fact supports the positive view that inspires this text. It postulates that there is a major distinction between practices and techniques that are economically sound and the use that financial firms make of these techniques. The financial crisis seems to be an example of what should not be done and strongly reinforces the need for sound practices and sound economics of financial firms, and an enhanced governance of financial firms.

Some implications follow. Risk management is made up from practices and tools, including risk models. Those are extremely different factors. Practices are subject to discretionary judgments and policies, to business development goals, as long as they comply with existing regulations. Technical tools and models are not.

Risk management techniques have made a lot of progress since the best practices were defined by various think-tanks and regulatory bodies. Does the crisis mean that all such progress is useless? Presumably, this is not so. It rather suggests that actual risk practices diverged from best practices, that governance has probably not been up to the standards of sound management policies, and that the growth of the financial sector, with increased risk and appetite for profitability, increased beyond what the financial system can sustain under current rules regulating the industry.

1.2 Scope and Goals of this Text

This introduction reminds one of some basic principles of risk management and explains how this text is positioned within a considerable range of financial literature. Loosely speaking, financial risks designate any uncertainty that might trigger losses.

Risk management designates the entire spectrum of risk management processes and risk models that allow banks to implement risk-based policies and practices. It covers all techniques and management processes required for monitoring and controlling risks, and the required risk models. The spectrum of processes and models extends to all financial risks, the main ones being credit risk, market risk, interest rate risk and liquidity risk. Operational risk, however, is not addressed in this text, essentially because it is a non-financial risk.

The risk prospective differs strongly from the business prospective. Business units focus on development and profit. Risk managers focus on risk control and limits, on potential losses rather than profit. While the former think “profit,” the latter think “worst case” situations. The main goal of risk policies and practices is viewed as controlling risk without impairing profitability, or “optimizing” the risk–return trade-off that all financial firms face.

If there were a single key priority to re-emphasize today, it would be risk oversight by bank professionals, supervisors and standards setters. Risk oversight implies awareness of risks embedded in the balance sheets and off the balance sheets of banks. Risk oversight also implies a minimum understanding of risk models and techniques, at least with respect to a sound usage of those, without going as far as turning all professionals into risk modelers.

Buzzwords such as “bank-wide risk management,” suggest that risk oversight across giant banks is widely shared and managed consistently across their wide array of business lines. Indeed, models and techniques have been designed for achieving such a goal. But the financial crisis also suggests that risk oversight was not well shared within banks or by other financial firms and regulators. Risk oversight implies knowledge of risks, a forward view on adverse events, plus the capability of enforcing risk controls and limits when risks drift away from guidelines making up banks’ policies.

Risk oversight and risk controlling is theoretically and practically feasible today because risk processes, techniques, and models are developed continuously for reaching this goal. Such a postulate is often challenged today in view of the wide underestimation of the magnitude of the crisis.

Last but not least, while risk management techniques have expanded for individual firms, the techniques for early detection of risk at the system-wide level remained nearly nonexistent, with an over-reliance on self-management and self-regulations by firms. It is striking that the target of risk regulations, system-wide risk, is not measured in any way, and that regulations focused on individual specific risk of financial firms. Measuring system-wide risk is a conceptual and practical challenge. Recognition of such a “regulation hole” now finally seems to emerge in current financial reforms.

2 POSITIONING OF THE TEXT

The positioning of this text in the literature should help readers to identify how it complements the multitude of texts and articles that relate to risk and to risk management.

2.1 The “Model Divide”

Current risks are tomorrow’s potential losses. Unfortunately, they are not as tangible as revenues and costs, thereby making risk modeling a conceptual and a practical challenge. Risk models and techniques have continuously expanded in recent years, enhancing the ability to monitor and control risk and to develop business activities without a myopic view on profitability. This is the “bright side” of risk models. The “dark side” is that, perhaps, the usage of risk models remained in the hands of a small group of “quants”, who used them without caring too much about explaining model risk to non-specialists. This is not a good enough reason to throw everything to the trash can. The modeling effort was productive and a necessary step in the development of better risk practices.

The gap between the technicality of the literature and the capability of risk professionals, who are not model experts, to integrate the complexity of models in their own practices is damaging. Presumably, such a gap exists, and grew through time as the 2008 crisis seems to suggest.

It is noticeable that, instead of a dissemination of model expertise across the entire industry, modeling techniques tended to concentrate in a smaller core of experts. Such a concentration

might explain the persisting and growing gaps between “model experts” and practitioners. Experts are “embedded” in banks, but being “embedded” does not imply that expertise is shared.

The book does not take harsh positions against models, even though it is relatively easy to pinpoint some model glitches¹ that were the sources of the financial crisis. Instead, it capitalizes on progress achieved that should allow banks to implement truly efficient risk management. It addresses risk processes and risk models, hoping to narrow the gap between specialists of quantitative finance and risk managers. It builds on a long experience in the risk department of banks and on academic knowledge.

Modelers will find here some reminders on classical finance models, which are pre-requisites to risk models, because there is no need for expanding such finance models beyond the essentials required for understanding risk models. However, risk models are expanded, explaining the rationale of models and illustrating them with examples. The text should help increasing transparency across the technicalities of risk management. It is balanced rather than technical, with a minimal background on risk modeling and an emphasis on how to assemble risk models in a consistent way, and on techniques and processes for making bank-wide risk management achievable.

As a consequence, an important goal of this book, as in previous editions, remains to address the “model divide” between model designers and risk professionals. Experts will find that some of the introductory essentials on modeling are fairly basic in this text. On the other hand, the larger mass of practitioners and students of risk management should find the text helpful because it is largely self-contained and integrated.

2.2 Risk Management versus Risk Instruments

Many risk management texts heavily focus on hedging instruments, mainly derivatives. Jumping to instruments for managing risk without prior knowledge of the source of risks bypasses the risk oversight principle. There is a major distinction between the usage of hedging instruments and the knowledge of what should be hedged in the first place.

Because derivatives are privileged instruments for controlling risks, they are introduced in a dedicated section of this book. But they are not the main focus of this book, because we know, in general, how to hedge a risk exposure once it has been properly identified. Financial institutions develop their business through an ever-changing innovation process of products. Innovation made it feasible to customize products for matching investors’ needs. It also allowed both financial and corporate entities to hedge their risks with derivatives. The need for investors to take exposures and, for those holding exposures, to hedge them provided business for both risk takers and risk hedgers.

Did that solve risk management issues in financial institutions? It did not because two basic pre-requisites of a risk management system, risk oversight and tracing risks back to risk drivers, are different issues to understanding how derivatives work. Hence, the gap remains between derivatives that makes risk management feasible and financial firms’ risk management focusing on risk oversight, the prerequisite for controlling risks with proper instruments.

¹ We refer here to unreliable inputs of default correlations in credit portfolio models and, presumably, a lack of stress-testing of valuation models (see the chapters in Section 9 “Dependencies” and Chapter 51 on portfolio modeling).

2.3 Reverting to Better Risk Practices and Lessons of the Crisis

This text proceeds step by step in developing the building blocks of a sound risk management scheme, with the postulate that a sound usage of risk models and techniques is a tangible advance and that the sources of the current issues have to be looked for elsewhere, in the drift of practices and policies away from “best practices,” rather than flaws of techniques, even though such flaws are pointed out throughout the text.

Some of the regulatory changes that emerge from the lessons of the crisis are ongoing, and some reforms have already been identified. But it is too early to foresee how regulatory changes will be implemented. A brief overview of future reforms being considered at the time of writing concludes the book. In between, we address risk management from a technical perspective, and maintain that sound risk processes and risk models have to be re-emphasized.

Moreover, the response to the crisis by financial authorities demonstrated that a major crisis implies that gains remain private while losses become publicly shared through massive government injections of cash and capital in ailing giant banks. Such responses, with the unique choices being either the “improvised” dismantling of failing financial firms or facing a financial collapse is unsustainable in the medium and long-term. It reinforces the critical need for sound risk practices and risk models for all financial firms, plus system-wide risk oversight.

3 BOOK STRUCTURE

The structure of the book is in 16 sections, each divided into several chapters. This structure facilitates a clear distinction between related subjects, with each chapter being dedicated to a specific topic. The benefit is that it is possible to move across chapters without necessarily following a sequential process throughout the book. Each chapter, or section introduction, provides a synthesis of the topics that will subsequently be expanded, allowing the reader to get an overview of each one and how it relates to the neighboring context.

The book outline is summarized by the list of sections, each of them divided into a number of different chapters dedicated to the related topics.

- 1 The Financial Crisis (2007–2008)
- 2 Business Lines, Risks and Risk Management
- 3 Financial Products
- 4 Valuation
- 5 Risk Modeling
- 6 Regulations
- 7 Asset Liability Management (ALM)
- 8 Fund Transfer Pricing Systems
- 9 Dependencies and Portfolio Risk
- 10 Market Risk
- 11 Credit Risk: Standalone
- 12 Credit Portfolio Risk
- 13 Capital Allocation
- 14 Risk-adjusted Performance
- 15 Credit Portfolio Management
- 16 Conclusion

The book addresses risk management in nine core blocks dedicated, respectively, to:

- Bank-wide risk management
- Asset liability management (mismatch risks)
- Risk regulations and accounting standards
- Market risk models
- Credit risk models
- Dependencies modeling
- Credit portfolio models
- Capital allocation
- Risk-adjusted performance
- Credit portfolio management

In between such core blocks are sections of three types. Some are here for providing a minimum background to subsequent issues. Others address parallel issues, many gathered in Sections 1 to 4 on the financial crisis, risk management principles and financial products. Others also provide parallel technical topics with the same purpose. Among other subjects, these sections provide the basics of derivatives, of main distribution functions of random variables, and of valuation. Note that valuation is a topic addressed in a considerable volume of literature whose purpose is to address pricing models, which is not the focus in this book. Rather, what is needed here is a minimum understanding on how to model potential losses and values (Section 4), summarizing some basic principles for valuation of risky assets, and providing minimal links with the pricing literature.

The extensive section on modeling dependencies, which is the foundation of diversification modeling within portfolios, is a transversal building block that applies to all portfolio models. The dependency topic is viewed from several angles, from traditional approaches as correlations and factor models up to the modern copula approach. Dependencies are addressed by keeping the focus on the essentials and on examples throughout a sequence of chapters.

We found that textbooks rarely address risk management in banking and in financial institutions in a comprehensive manner. We have tried to compensate for such gaps, by making a compromise between technicalities and simplicity, without sacrificing scope. Readers will realize that a balanced coverage of major risk models and practices is a goal that has inspired the entire volume.

The text develops many numerical examples, while restricting the analytics to the essentials. Simple examples help in illustrating the essentials better than formal descriptions. Of course, simple examples are no substitutes to full-blown models.

Finally, there is a balance to strike between concepts, analytics and applications. The goal of risk management is to use risk models for instrumental purposes and enriching the risk processes. This principle inspired this text by making it implementation focused. From a risk management perspective, it is important to understand which are the basic data required to model risk, the guidelines for implementing models, what are their outputs and how these should feed risk processes. For example, sample reports useful for management purposes, such as ALM or credit portfolio risk reporting, are included.

4 THE THIRD EDITION

The third edition of this book adds major and voluminous extensions to the previous edition.

The very first chapter deals with the financial crisis, which could not be a better introduction to the challenges of risk management in financial firms. The overview of risk management and risk models has been extended. The financial products section is also a full addition to the previous edition. The valuation section is entirely changed and expanded. The dependency section has been fully expanded to cover all approaches to dependencies, from the traditional techniques and up to the modern, more involved, techniques. The regulations section comprehensively covers the Basel 2 regulations using, as building blocks, the various approaches and sub-approaches. It now includes some essential features of accounting standards. Excerpts of Basel 2 are scattered in different chapters, notably in presenting cash products. Some of the analytics underlying the Basel 2 formulas are expanded in the credit sections.

Note that regulations are not the starting point of this text because these rely on risk management topics and issues. Risk management topics are introduced gradually without distortions between rule-based regulations and risk economics. Regulations are addressed in a dedicated section as they should, as regulatory application of risk models and risk processes.

As it is, the text sticks to the principle that sound models and sound implementation of risk management techniques remain the reference, and that the crisis is a massive evidence of absence of compliance with otherwise sound practices, governance and models. Therefore, the text has no negative view of risk models and practices, which tend to expand today, as expected in times of a major crisis.

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SECTION I

The Financial Crisis

The 2007–2008 Financial Crisis

The crisis of 2007 and 2008 was a system-wide crisis whose amplitude is unprecedented in modern finance. It is systemic, in that it extends to the entire financial system. The sub-prime crisis should have been contained within the small segment of sub-prime mortgages. Financial risks of regulated firms are subject to strict regulations, whose purpose is precisely to avoid systemic, or “system-wide,” crisis. Instead, it extended to the entire financial system and triggered economic contagion. Why did regulations fail? What went wrong?

The crisis expanded through “traditional” contagions, the contaminations of other segments of the system by a local event, and through procyclical effects. Procyclicality refers to the magnification of the amplitude of cycles. Moreover contagion and procyclical effects interacted with each other, revealing unexpected and interconnected effects, as seen in the various papers and official documents¹ used as a starting point for defining reforms of the overall regulation system.

Contagion and procyclicality are joint effects, which make them difficult to segregate. Many contagion effects detailed hereafter contribute to procyclicality and the reverse is also true. In this introductory chapter on the crisis, they are sometimes isolated for convenience.

Accordingly, this chapter starts with a brief overview of the sub-prime market, the classical contagion mechanisms, the financial risks, and the basics of risk regulations and of accounting regulations. The next sections address new contagion effects that emerged from the crisis. Those include adverse effects of accounting standards, the dissemination of risks through securitization, the liquidity crunch and its mechanical contagion effect, the procyclicality resulting from regulations and financial firms’ behaviors, the role of lagged rating adjustments, the adverse effects of collateral-based leverage. Although the governance of banks is an issue in this context, we focus on the above effects.

¹ The Financial Stability Forum [28] focuses on procyclicality, and the White Paper of the White House [79] addresses other aspect of the crisis and proposes reforms. Both are reviewed in the concluding chapter, Chapter 60.