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MANAGING CREDIT RISK

The Great Challenge for Global Financial Markets

SECOND EDITION

John B. Caouette Edward I. Altman Paul Narayanan
Robert W. J. Nimmo

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Chapter 10: Credit Risk Models Based upon Accounting Data and Market Values

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We dedicate this book to our wives, Judy Caouette, Elaine Altman, Vasantha Narayanan, and Linda Jensen.

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Narayanan has been involved credit risk management for more than two decades and in the development of analytical solutions for credit issues as an executive in major institutions, which have included the predecessors of JPMorgan Chase, Bank of America, and Mellon Bank. His work has included failure prediction models of which ZETA (Z-score) model is the best known. He helped build ZETA with Dr. Edward Altman. He has developed and implemented credit and portfolio models in the entire asset spectrum—corporate debtors, residential real estate, financial institutions, and consumer loans.

For several years he was consultant to banks and insurance companies on credit and portfolio management. His clients have included Zeta Services, CASA, Citigroup, Enhance Financial Services, Asian Development Bank, and Banco Provincia de Buenos Aires. Paul has published, taught, and delivered talks on credit and portfolio risk in many forums, including the Society of Actuaries, the Wharton School of the University of Pennsylvania, NYU Stern School, Drexel University, Fundacao Getulio Vargas, IACPM, and the Central Bank of Argentina.

Robert W. J. Nimmo has enjoyed a 37-year-long international banking career in a number of different roles and countries. He started with 24 years at Citigroup, serving in both line and risk management. He was a member of the Groupwide Credit Policy Committee, based in Tokyo, and served with Citigroup in the United States, Hong Kong, the Philippines, and Japan.

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Introduction

Credit risk is the oldest form of risk in the financial markets. If credit can be defined as “nothing but the expectation of a sum of money within some limited time,” then credit risk is the chance that this expectation will not be met. Credit risk is as old as lending itself, which means that it dates back as far as 1800 BCE.[1] It is essentially unchanged from ancient Egyptian times. Now as then, there is always an element of uncertainty as to whether a given borrower will repay a particular loan. This book is about how financial institutions are using new tools and techniques to reshape, price, and distribute this ancient form of financial risk.

Ever since banks as we know them were organized in Florence 700 years ago, they have been society’s primary lending institutions.[2] *Managing Credit Risk* has formed the core of their expertise. Traditionally, bankers and other lenders have handled credit evaluation in much the same that tailors approach the creation of a custom-made suit—by carefully measuring the customer’s needs and capacities to make sure the financing is a good fit. When we originally wrote this book in the late 1990s, it was accurate to say that the approaches taken then did not differ fundamentally from the one used by the earliest banks. This is not necessarily the case today, although the changes we will comment on later in the book still vary from institution to institution, and certainly there are major differences between money center institutions, regional banks and banks in emerging markets. Meanwhile the first decade of the twenty-first century has seen the credit markets become the focus of a whole new category of lender including hedge funds, private equity firms, and other institutional players who are bypassing the traditional credit methodologies in favor of the new ways of credit risk management. Thanks to the creation of credit

derivative products, market participants can take or shed credit risk on any entity anonymously, that is, without entering into any legal credit arrangement with that entity or lending to it. This is one of the reasons you find a bank in Germany taking credit risk on a subprime home mortgage in Kansas without ever seeing either the borrower or the property. This used to be the preserve of the local Kansas bank.

It is easier to design a suit for a customer you already know. Because of the very nature of this approach, banks historically have been drawn to *relationship banking.* This led to a pattern where they were more concerned about their relationship with a customer than they were about the profitability of a specific loan or about the effect a given transaction may have on their overall loan portfolio. As long as a borrower met the credit criteria, the bank did not pay much attention to concentrations that were building up. Citibank's buildup of construction loans and the effect they had on the institution when these loans went sour in the late 1980s is a case in point. At the time of the publication of the first edition of *Managing Credit Risk,* the banking industry had begun to recover from a crisis that had emerged nearly a decade earlier. There was widespread recognition within the industry that the traditional approach to lending had led to unacceptable results and that banks had done a rather poor job of pricing and *Managing Credit Risk.*

In some ways the banking crisis of the day was just what you would expect from an industry that was adapting to a more limited role in the provision of credit. In other ways, it reflected an evaluation that the traditional banker/client roles needed some updating if not revolutionary change. Those who read our first edition would not have had to look hard to find a decidedly negative view of how banks were dealing with credit risk at the turn of the century. Less than a decade later, things look a lot different. Later in this

introduction, we list the 10 major changes that are shaping the management of all risk, credit included. Those changes are significant and banks are at the cutting edge of the change. So we take a more generous view of the way banks are managing credit and portfolio risk and in many places you will see us holding many of them up as examples of excellence in the management of this risk. They are better, but as we can now see in the subprime mortgage crisis at the end of 2007, they are still capable of major missteps.

The first decade of the twenty-first century has seen the credit markets transformed by several institutional developments. First, the markets mirror their environment: They have become global, highly innovative, and of critical importance to the global economy. The top market players have developed into universal *megabanks.* There are a handful of such organizations, which were formed from the top ranks of what was once the top tier of commercial or investment banks. Now they do both investment and commercial banking as well as many other types of investment related services and lending. The names are familiar—-Citicorp, JPMorgan Chase, Goldman Sachs, Morgan Stanley, UBS, Merrill Lynch, Deutsche Bank, Credit Suisse, Bank of America, and so on. These organizations are on the cutting edge of credit risk management and are a proving ground for “best practices” within the industry. Secondly, *real* credit risk has been embraced by the capital markets and this has fueled the development of whole new categories of lenders including structured finance lenders, hedge funds, private equity firms, and others who, for the most part, are finding new ways to approach credit risk management. Thirdly, credit risk management has evolved into total enterprise risk management. Best practice for the major players is to include market, operational, and reputation risk alongside the management of credit. Finally, the shape and day-to-day operations of the credit risk

markets in this new millennium are heavily influenced by regulators who are setting the rules (e.g., Basel II and Solvency II) for most of the players in a much more sophisticated way, and by the rating agencies whose rating practices have set the market standard of credit risk measurement—especially with respect to securitized products.

The counterpart to credit risk is market risk—the chance that an investment's value will change in price as a result of marketplace forces such as interest rates, commodity prices, and currency levels. Market risk has affected financial institutions ever since markets were created. Techniques for managing market risk have undergone a radical change. Anyone who tours a large trading floor at a bank or an investment bank can see that the management of market risk has been the focus of tremendous technological development. Major breakthroughs have turned this aspect of risk management into something of a science—one that is applied to both equities and debt instruments. Market risk developments were an important precedent for our focus on credit risk management. Some have commented that the 1980s were a period when market participants focused on how to manage market risk. This led to the Basel Committee introduction in 1995 of a system that allowed banking institutions to set capital requirements based on market risk levels calculations using the models the banks had developed. This focus on models and other mathematical analysis by the Basel Committee continued as they turned to the management of credit risk in Basel I and II.

This is not to suggest that market risk has been eliminated. In the case of America's savings and loan associations, for example, an entire industry quaked because of bad bets made on commercial real estate asset values during a period when deregulation was increasing

the risks in the financial markets. Periodically, we learn of major losses experienced by trading firms that are the result of “rogue traders” who are identified—after the fact and accused of misappropriating the firm’s capital. Sometimes the problem is that a firm does not really understand what it is doing (despite a great pedigree such as with Long Term Capital Management) and bets the ranch on a losing idea.

Despite its shortcomings in anticipating systemic events and overcoming the actions of some individuals, the science of managing market risk does nevertheless reflect late twentieth-century knowledge and technology. For example, banks have adopted the concepts of gap management, duration, and even the theory of contingent claims. Major banks have created huge markets for interest rate and currency swaps.

By contrast, in 1998, when we first published *Managing Credit Risk,* the management of credit risk at banks was, to a substantial degree, a kind of cottage industry in which individual leading decisions were made to order. As befitted a cottage industry, there was, for the most part, no common credit language. Practitioners, academics, and regulators heatedly debated fundamental measurements such as default timing, default events, workout costs, and recoveries. There was a dearth of reliable quantitative data on financial and nonfinancial variables as well as on recovery rates following failure. There was, however, at the time, a considerable effort underway to improve the situation. Many studies were initiated by Edward Altman and the rating agencies on default levels and recovery rates, but they were all a work in progress and not yet internalized by many leading institutions. Ten years later things look a lot different. Credit risk is still a tougher risk to master than market risk. There are many more variables to consider. However, we now have many more tools, much more information and some important new players who are willing

to take credit risk, expect to be fairly compensated for it, and are demanding more transparent market pricing.

TOP 10 CHANGES IN THE CREDIT MARKETS IN THE LAST DECADE

- New product innovations, particularly in the credit derivative and structured finance areas and the standardization of older innovations.
- The growing sophistication of the major players in the credit markets in terms of techniques and strategies.
- The increased use of scientific and mathematical models (e.g., credit scoring models for residential mortgage lending and correlation models to price basket credit default swaps).
- The New Basel accords, which have directly shaped the banking markets and indirectly influenced market participants in general (often called *regulatory capital arbitrage).*
- The ready availability and easy delivery of reliable credit information on a global basis, 24/7 through the Worldwide Web.
- The phenomenal growth in technology and systems capabilities at affordable prices leading to better reporting and modeling.
- Huge changes in the markets themselves, in terms of size, liquidity, and globality.
- The emergence of hedge funds as major investors in the markets.
- The growing influence of the rating agencies.
- Lower levels of loss and higher levels of liquidity led to constantly reducing credit spreads, which reached their historical lows in June 2007. This market frenzy was a

vortex dragging more people into what turned out to be poor credit choices.

Creating this list was the first thing we did after deciding upon a revision of this book. We knew that many changes have taken place over the past decade, and it seemed like an important first step to try to capture them in a list that we could agree on and refer to as we made changes. Everyone might not agree with our 10 and certainly others might wish to emphasize or describe things somewhat differently. However, we doubt that we would have a substantially different list if we polled everyone who is working in the credit markets of Europe and the United States. Nevertheless, the list is our own and forms the basis for all the changes that will appear in the second edition of *Managing Credit Risk.*

EVOLUTION OF CREDIT RISK IN THE ECONOMY

Credit risk is a consequence of contracted and/or contingent financial transactions between the providers and users of funds. To understand how it has evolved in modern times, we have to look at the private corporation as the vehicle of economic growth. In precapitalist societies, family and sovereign wealth were the primary bearers of credit risk. Subsequently, the formation of joint stock corporations created entities that were able to pool resources, bear economic risk, borrow money, and exist beyond the natural lives of the owners. Financial intermediaries were created to pool savings and provide them to the users of funds. Even before interest expenses were given preferential tax treatment, corporations (for example, railroads and utilities) used the debt market to raise funds from distant investors, using corporate assets or a government guarantee to secure

their borrowing. The bond markets and banks were the dominant providers of debt capital (see Baskin and Miranti 1997).

As markets grew, other providers of funds gradually took market share away from banks. Junk bonds, asset-based securities, and commercial paper displaced conventional bank financing to a significant extent. A primary reason for this was economics. According to Bryan (1993), the total cost of intermediating a security over the life of an asset is under 50 basis points, whereas the cost of bank intermediation is well over 200 basis points.

A NASCENT SCIENCE OF CREDIT RISK MANAGEMENT

In the mid-1980s and early 1990s, the United States experienced record defaults on bank loans and corporate bonds. When junk bond defaults jumped to over 10 percent in the years 1990 and 1991, many observers argued that both junk bond and the leveraged bank lending markets were likely to disappear. The high-yield bond markets recovered, however, and reached record volumes later in the decade.

Prompted in large part by very poor performance in their portfolios in the mid-1980s, practitioners of credit risk management became increasingly interested in new techniques. However, the heightened concern about credit management that emerged did not evolve into a pervasive drive to create and deploy new evaluation techniques. Nor did banks embrace portfolio management, believed to be much needed for them. Instead, this period saw the development of a few standalone models, continued refinement of some relevant default databases (first established in the late 1980s), and a spate of surveys be