

Chapter 1

Why New Approaches to Credit Risk Measurement and Management?

INTRODUCTION

In recent years, a revolution has been brewing in the way credit risk is both measured and managed. Contradicting the relatively dull and routine history of credit risk, new technologies and ideas have emerged among a new generation of financial engineering professionals who are applying their model-building skills and analysis to this area.

The question arises: Why now? There are at least seven reasons for this sudden surge in interest.

STRUCTURAL INCREASE IN BANKRUPTCIES

Although the most recent recession hit at different times in different countries, most bankruptcy statistics showed a significant increase in bankruptcies, compared to the prior recession. To the extent that there has been a permanent or structural increase in bankruptcies worldwide—possibly due to the increase in global competition—accurate credit risk analysis becomes even more important today than in the past.

DISINTERMEDIATION

As capital markets have expanded and become accessible to small and middle market firms (e.g., it is estimated that as many as

2 *Why New Approaches to Credit Risk Measurement?*

20,000 U.S. companies have actual or potential access to the U.S. commercial paper market), the firms or borrowers “left behind” to raise funds from banks and other traditional financial institutions (henceforth, FIs) are increasingly likely to be smaller and have weaker credit ratings. Capital market growth has produced a “winner’s curse” effect on the credit portfolios of traditional FIs.

MORE COMPETITIVE MARGINS

Almost paradoxically, despite a decline in the average quality of loans (due to the second reason above), interest margins or spreads, especially in wholesale loan markets, have become very thin—that is, the risk–return trade-off from lending has gotten worse. A number of reasons can be cited, but an important factor has been the enhanced competition for lower-quality borrowers, such as from finance companies, much of whose lending activity has been concentrated at the higher risk–lower quality end of the market.

DECLINING AND VOLATILE VALUES OF COLLATERAL

Concurrent with the recent Asian crisis, banking crises in well-developed countries such as Switzerland and Japan have shown that property values and real asset values are very hard to predict and to realize through liquidation. The weaker and more uncertain collateral values are, the more risky lending is likely to be. Indeed, current concerns about “deflation” worldwide have accentuated concerns about the value of real assets such as property and other physical assets.

THE GROWTH OF OFF-BALANCE-SHEET DERIVATIVES

The growth of credit exposure, or counterparty risk, because of the phenomenal expansion of derivative markets, has extended the

need for credit analysis beyond the loan book. In many of the very largest U.S. banks, the notional (not market) value of their off-balance-sheet exposure to instruments such as over-the-counter (OTC) swaps and forwards is more than ten times the size of their loan books. Indeed, the growth in credit risk off the balance sheet was one of the main reasons for the introduction, by the Bank for International Settlements (BIS), of risk-based capital (RBC) requirements in 1993. Under the BIS system, banks have to hold a capital requirement based on the marked-to-market current value of each OTC derivatives contract (so-called current exposure) plus an add-on for potential future exposure.¹

TECHNOLOGY

Advances in computer systems and related advances in information technology—such as the development of historic loan databases by the Loan Pricing Corporation and other companies—have given banks and FIs the opportunity to test high-powered modeling techniques. For example, besides being able to analyze loan loss and value distribution functions and (especially) the tails of such distributions, they can move toward actively managing loan portfolios based on modern portfolio theory (MPT) models and techniques.²

THE BIS RISK-BASED CAPITAL REQUIREMENTS

Despite the importance of the six reasons discussed above, probably the greatest incentive for banks to develop new credit risk models has been dissatisfaction with the BIS and central banks'

¹See the discussion in Saunders (1997), and Chapter 13.

²Arguably, technology and the increased liquidity in the secondary market for loans (along with the development of credit derivatives) have helped move the "lending paradigm" away from a buy-and-hold strategy to one in which loans and credit risk are actively managed in a portfolio framework [see, for example, Kuritzkes (1998)].

4 *Why New Approaches to Credit Risk Measurement?*

post-1992 imposition of capital requirements on loans. The current BIS approach has been described as a “one size fits all” policy; virtually all loans to private-sector counterparties are subjected to the same 8 percent capital ratio (or capital reserve requirement), irrespective of the size of the loan, its maturity, and, most importantly, the credit quality of the borrowing counterparty (see Appendix 1.1). Thus, loans to a firm near bankruptcy are treated (in capital requirement terms) in the same fashion as loans to a AAA borrower. Further, the current capital requirement is additive across all loans; there is no allowance for lower capital requirements because of a greater degree of diversification in the loan portfolio.

At the beginning of 1998 in the United States (1997 in the European Community), regulators allowed certain large banks, the discretion to calculate capital requirements for their trading books—or market risk exposures—using “internal models” rather than the alternative regulatory (“standardized”) model. Internal models have had certain constraints imposed on them by regulators and are subjected to back-testing verification;³ nevertheless, they potentially allow for (1) the value at risk (VAR) of each tradable instrument to be more accurately measured (e.g., based on its price volatility, maturity, etc.) and (2) correlations among assets to be taken into account. In the context of market risk, VAR measures the market value exposure of a financial instrument in case tomorrow is a “bad day,” defined statistically. For example, under the BIS market risk regulations, when banks calculate their VAR-based capital requirements using their internal models, they are required to measure the bad day as the 1 bad day that happens once every 100 business days.

The questions for bankers and regulators, and among the major questions analyzed in this book, are:

1. Can an “internal model” approach be used to measure the value at risk or capital exposure of (nontradable) loans?

³For a discussion, see Lopez and Saidenberg (1998).

2. Do internal models have sufficient flexibility and accuracy to supplant the current standardized 8 percent risk-based capital ratio that imposes the same capital requirement on virtually all private-sector loans?

Even if it is felt that internal models have some way to go before they can replace the 8 percent rule—especially because of the nontradability of loans compared to marketable instruments, and the lack of deep historic databases on loan defaults—the new internal models may still have significant value to bankers, FI risk managers, regulators, and corporate treasurers.⁴ Specifically, internal models potentially offer better ways to value outstanding loans and credit-risk-exposed instruments such as bonds (corporate and emerging market), as well as better methods for predicting default risk exposures to borrowers and derivative counterparties. Moreover, internal models (1) allow (in many cases) the credit risk of portfolios of loans and credit-risk-sensitive instruments to be better evaluated, and (2) can be used to improve the pricing of new loans, in the context of an FI's risk-adjusted return on capital (RAROC), and of relatively new instruments in the credit-derivatives markets, such as credit options, credit swaps, and credit forwards. Finally, the models provide an opportunity to measure the privately optimal or economic amount of capital a bank (or FI) should hold as part of its capital structure.

Before we look at some of these new approaches to credit risk measurement, a brief analysis of the more traditional approaches will heighten the contrast between the new and traditional approaches to credit-risk measurement.

⁴ At the time of this writing, the BIS Committee was about to release a document considering changes to the current credit-risk capital requirement. It is widely expected that a three-stage plan will be suggested. The first stage will involve minor modifications to the BIS rules, the second stage will involve the greater use of bank rating systems, while the third will involve a potential movement toward the use of bank internal models.

Appendix 1.1

Risk-Based Capital (RBC) Requirements for Selected Banking Book Instruments

Percent of maximum possible credit loss.

Type of Instrument	Effective Total RBC Requirement
Whole loans:	
Uncollateralized/guaranteed	8.0 percent
Collateralized/guaranteed	
*OECD government	0.0
OECD bank/securities dealer	1.6
Other collateral/guarantee	8.0
Loan commitments:	
One year or less	0.0
More than one year	4.0
Written put options (loans or bonds)	0.0
Financial guarantees (including credit derivatives):	
Direct credit substitute	8.0
Recourse	8.0 to 100 (usually 100 percent under "low-level recourse" rule)

* OECD = Organization for Economic Cooperation and Development.

Source: Federal Reserve Board of Governors.