Research Report...
Why Lending Crises Occur So Frequently

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In this article, the authors examine the origin of the banking industry's lending crises. They compare the performance of loan portfolios with the performance of corporate bonds and use a Monte Carlo simulation to predict the frequency of lending crises. They conclude that a loan portfolio of BB-rated quality has a likelihood of experiencing a lending crisis once every 11.5 years. The authors also suggest four steps for banks to take to avoid future lending crises.

The 1980s brought dramatic changes to the profit dynamics of commercial banking. The industry witnessed one lending disaster after another:

The decade began with crises in loans to lesser developed countries (LDCs) and agriculture. As the decade pro-gressed, energy loans began to take their toll, leading to the downfall of such institutions as Continental, SeaFirst, and most of the major Texas banks. As the decade came to a close, highly leveraged transactions (HLTs) and commercial real estate loans decimated the earnings of major banks in the East and the Far West. The number

of troubled and failed institutions rose to postdepression highs.[1]

Numerous commentators have expressed alarm at this pattern of lending crises and have attempted to identify the underlying causes. Explanations have ranged from a breakdown in credit discipline to deterioration in borrower credit quality to aggressive loan growth in support of short-term earnings goals.

While we believe that all of these factors are important, we think that the frequency of lending crises is a natural, mathematical outcome of a downward shift in the credit quality of borrowers over the past 20 years. A greater percent of loan portfolios are now composed of noninvestment-grade borrowers that default with greater frequency, and when coupled with portfolio concentrations, these borrowers have the potential to cause losses great enough to cripple even the largest commercial banks. For the banks that survive a lending crisis, many years of profits can be devoured by a single year's losses in the midst of the crisis.

What Is a Lending Crisis?

Credit downturns occur when greater than normal numbers of borrowers default and cause losses to a bank. Credit downturns become crises because they are unpredictable, and they may be unpredictable in both magnitude and frequency. Often, a downturn becomes a crisis because losses from defaults exceed a critical level, say, meeting or exceeding a bank's reserves for loan losses. When this point is reached, the bank's capital position may be threatened.

Statistically, uncertainty or variability is enumerated by the standard deviation, which is the measure of dispersion around an average value. While commercial bankers may not always think of credit risk in statistical terms, the standard deviation of default or loss is a useful tool to describe the uncertainty of credit risk.

Default, by its nature, is a binomial event; that is, there are only two states related to it—default or nondefault. The standard deviation of a binomial variable is defined by the following formula:

$$\sqrt{p(1-p)}$$

In this formula, p is the probability of default. Clearly, as p increases, so does the standard deviation of p. Thus, we can expect that as the risk of nonpayment increases as a loan declines in credit quality (or moves down the credit-rating scale), the variability of default risk will increase.

Although there are few sources of publicly available data on the default rates of bank borrowers, the commercial bond market allows us to test this premise. As shown in Figure 1, numerous years of bond default data show that as default risk increases, so does the variability of default.

We should note that the actual standard deviation rates shown for

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[1] John E. McKinley and John R. Barrickman, *Strategic Credit Risk Management* (Philadelphia: Robert Morris Associates, 1994), p. 2.

Figure 1. Default Rates for Corporate Bonds

Rating	Moody's Investor Services (1970-1993)			Standard & Poor's (1981-1993)		
	Average %	Expected Standard Deviation %	Actual Standard Deviation %	Average %	Expected Standard Deviation %	Actual Standard Deviation %
AAA	0.00	0.00	0.00	0.00	0.00	0.00
AA	0.02	1.41	0.06	0.00	0.00	0.00
A	0.01	1.00	0.05	0.06	2.45	0.13
BBB	0.16	4.00	0.29	0.28	5.28	0.29
BB	1.79	13.26	1.89	1.34	11.50	1.24
B	8.31	27.60	4.94	5.39	22.58	3.02
CCC	—	—	—	17.15	37.69	9.95

Source: Moody's Investor Service, "Corporate Defaults and Default Rates 1970-1993," *Global Credit Research*, January 1994, and Standard & Poor's, "1993 Corporate Default, Rating Transition Study Results," *Credit Review*, May 1994.

the bond market are considerably less than those expected based on the formula defining standard deviation. This discrepancy is owing to diversification. The diversification of the corporate bond market limits the volatility of default, which, in turn, reduces the standard deviation of the portfolio.[2]

A Fictional Example

We have shown the correlation between default risk and its variability, but how does this relationship tie to lending crises?

To examine this issue further, let us examine the fictional institution, Bank XYZ. Bank XYZ is a $25-billion regional bank and a dominant lender to middle market companies in its region. In addition to commercial lending, XYZ Bank has supporting operations in consumer lending and personal trust. Over the past 10 years, the nonaccrual rate on its commercial loan portfolio has been 200 basis points (bp) per year. This is roughly equivalent to low BB-rated credits. (As shown in Figure 1, the default rate for BB-rated credits is 134-179 bp.)

For XYZ Bank, lending appeared to be profitable until the past year when the nonaccrual rate rose to 500 bp, leading to 125 bp in charge-offs. Management, stunned at the magnitude of this change, sought answers and hired a consultant to determine how often such an event could occur. The consultant's answer was every 11.5 years.

This answer astounded the senior managers of XYZ, and they insisted on knowing how this conclusion was reached.

The consultant, in conjunction with Bank XYZ's management, had defined a lending crisis as any year in which charge-off rates were 125 bp or more or nonaccrual rates were 500 bp or more. The frequency of lending crises therefore was equal to the number of years in which one or both criteria were met.

Through a Monte Carlo simulation, the consultant estimated the frequency of lending crises for bank portfolios categorized by credit quality in the same manner as corporate bonds. The results, shown in Figure 2, demonstrate that the frequency of lending crises grows exponentially as the average default risk in the portfolio increases.

For example, if the credit quality of the portfolio is investment grade (BBB or better), there is essentially no risk that a lending crisis could produce default rates of 200 bp or more. However, once the average credit quality of the portfolio becomes noninvestment grade (BB or worse), annual default rates of 500 bp or more will occur once every 11.5 years for BB-rated portfolios (8.7% probability) and once every 1.5 years for B-rated portfolios (65.3% probability).

In other words, for a portfolio of BB quality, annual default rates will exceed 200 bp once every 3.4 years, 500

Figure 2. Likelihood of a Lending Crisis

Risk Rating	Probability that Annual Default Rates Will Match or Exceed			
	200bp %	500bp %	800bp %	1000bp %
A or better	0.0	0.0	0.0	0.0
BBB	0.0	0.0	0.0	0.0
BB	29.5	8.7	4.3	0.0
B	87.1	65.3	34.8	21.8

Source: Moody's Investor Service.

bp once every 11.5 years, and 800 bp once every 23 years. Remarkably, B-rated portfolios will experience default rates of 1,000 bp once every 4.6 years.

Major Shifts in Commercial Lending

The consultant to XYZ bank explained that over the past 25 years, the nature of commercial lending has changed considerably. The growth of the corporate bond and commercial paper markets has supplanted many of banks' highest quality commercial borrowers. Investment-grade companies increasingly borrow in public debt markets in which borrowing costs are cheaper. And banks increasingly lend to noninvestment-grade corporations or partnerships, such as commercial real estate, cable television, leveraged buyouts, and recapi-

talizations. The result has been a steady increase in loan losses, exacerbated by excess capital periodically flowing to the riskiest borrowers.[3]

The downward shift in the credit quality of borrowers has been accompanied by a decrease in market share of the assets held by banks. At the beginning of this century, banks held approximately 85% of all financial sector assets. By 1950, that share had dropped to nearly 70%, and in 1990, banks' share was 40%. The most current data show commercial banks holding only 25% of financial sector assets in 1993.

Given that commercial banks are high-cost providers of capital, this shift may be permanent. The commercial banks of the 1990s may have a corporate customer base imposing greater risk of lending crises than in the past. Individual banks with nonin-

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[2] In addition, actual standard deviations are calculated assuming, incorrectly, a normal distribution for default rates. In fact, default rates cannot go below zero. This truncation means actual standard deviations understate true volatility.

[3] Bruce G. Stevenson, "Capital Flows and Loan Losses in the Commercial Banking Industry," *Journal of Commercial Lending*, September 1994, pp. 18-26.

vestment-grade loan portfolios are likely to have lending crises about once a decade, and the industry as a whole may have multiple crises in that same decade, as seen in the 1980s.

Mitigating the Risks of Lending Crises

Faced with this assessment, management of Bank XYZ asked what could be done to avoid future lending crises and how to mitigate risk. The following four answers were obvious:

1. **Credit concentrations could no longer be permitted.** Since defaults tend to occur in waves (such as commercial real estate in the mid-1970s and during 1989-1990 and multiple bankruptcy waves in the airline industry), a concentration of loan exposures in a key sector amounts to a "bet" on the performance of that sector and, in particular, a timing bet against waves of defaults while there is a concentration in the portfolio. Since the timing of default waves cannot be predicted, Bank XYZ's managers determined that they could not afford the incremental risk that credit concentrations produce.

2. **Default prediction for commercial borrowers must be enhanced.** Since the variability of default increases exponentially as a credit declines in credit quality, every tool available should be brought to bear on the evaluation of default risk. To complement traditional credit evaluations conducted by line and credit administration personnel, Bank XYZ added credit-scoring tools to statistically predict the likelihood of borrower default.

3. **Risk-adjusted pricing must become the norm for commercial lending at Bank XYZ.** Loans made to noninvestment-grade borrowers require significant equity, reserves, and provisions, both for expected loss—loss that would happen if defaults occurred at the average rate and if loss severity in default was at its norm (affecting provisions and reserves)—and for unexpected loss—default risk or loss severity that is greater than the norm (affecting equity).

   Although few banks have formally allocated capital in proportion to risk, Bank XYZ chose to do so to encourage loan officers to lend only to strong borrowers and to ensure that bank shareholders receive adequate returns. Given a competitive pricing environment and low nominal returns on commercial loans, only high-quality credits can produce a return that meets the bank's hurdle rate for risk-adjusted equity. Strong credits will also limit the bank's exposure to lending crises.

4. **Bank XYZ must actively enter the secondary markets to balance its portfolios (to avoid or mitigate credit concentrations) and to purchase portions of broadly syndicated, investment-quality credits.** Bank XYZ will actively buy and sell loans in the commercial loan secondary market and

will explore the use of credit derivatives to offset some of the credit risks in its loan portfolios.

Conclusion

Our research seems to confirm that lending crises are a natural mathematical outcome of the shift in the credit quality of commercial borrowers from investment grade to noninvestment grade. The volatility of default for noninvestment-grade borrowers ensures that annual default rates of 500 bp or more will occur at least once a decade for a given bank. Within the banking industry, multiple crises are possible within one decade, as seen in the 1980s. These crises clearly threaten the profitability of commercial lending and, at their worst, may threaten the solvency of individual banks.

Banks can actively manage commercial loan portfolios to mitigate these risks. Among the best strategies are quantitative prediction of default risk—such as through credit-scoring, risk-adjusted pricing and profitability measurement—and active management of credit concentrations through the establishment of concentration limits and by loan trading. If these measures are employed, a bank will be taking preventive action to avoid future lending crises. ∎