

# The Tail Wags the Dog in Commercial Lending

By Bruce G. Stevenson

One cause of credit crises: Risk at banking institutions is defined by what occurred most recently.

The collapse of the global credit markets in 2008, which began as a failure of subprime mortgages, clearly is the worst financial crisis since the Great Depression. This catastrophe is very damaging to banks and to the U.S. commercial and investment banking industries. However, such crises are nothing new; the history of the U.S. financial markets is replete with them, and the present mess differs only in its magnitude.

For the banking industry, the result of these events is self-evident: *Years of profits can be wiped out in a single crisis.* In severe circumstances, individual banks and groups of banks fail. Such was the case for the commercial real estate (CRE) crisis of the late 1980s and early 1990s and such is the case for the subprime mortgage debacle of the current era.

This article addresses credit crises in commercial lending, their implications to the profitability of this business and their consequences for the commercial banking industry. The central argument is that such catastrophes are the key to the profitability and the viability of commercial lending. Banks that invest in wholesale lending take big risks, risks that periodically manifest themselves in credit crises and in which the profitability of the business—and sometimes the bank—is threatened. As will become clear, the tail wags the dog in commercial lending.

## Market Crises and Their Consequences

Crises in the global financial markets, many of which are collapses in the commercial lending markets,

occur about twice a decade (Exhibit 1). Episodes of illiquidity and market risk often create extreme losses to banks, though credit crises are most often the events that lead to bank failures. And, of course, the entire investment banking industry disappeared in the current mess, with the failure of Lehman Brothers, the acquisitions of Bear Stearns and Merrill Lynch and the conversion of Goldman Sachs and Morgan Stanley to commercial bank holding companies.

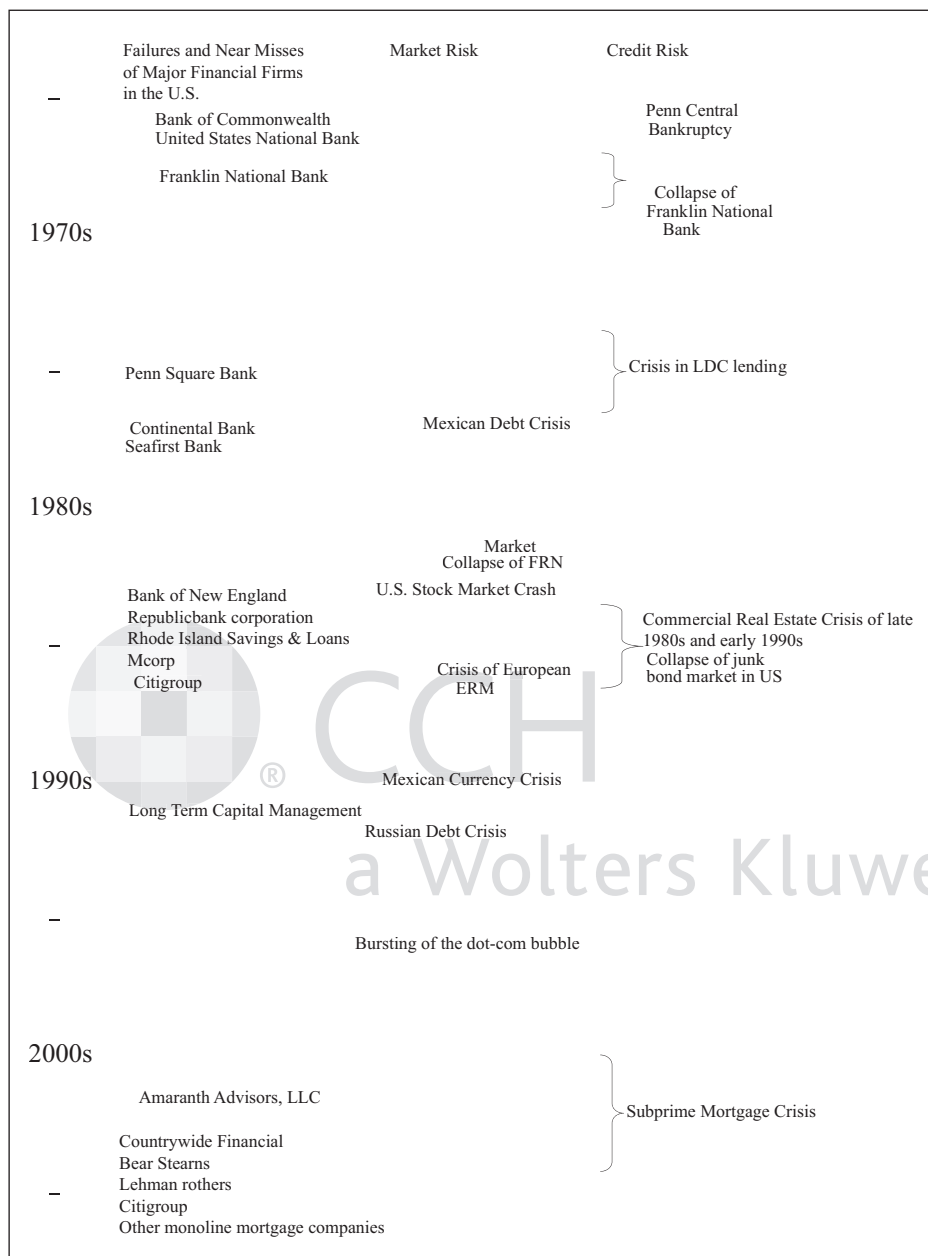
For those banks that survive, the consequences can be devastating. Citigroup is one example. According to some observers, Citigroup has been technically insolvent twice in the last several decades: once in today's subprime credit catastrophe and once in the early 1990s associated with the collapse of the U.S. CRE market.<sup>1</sup> In fact, since the 1970s, Citigroup has experienced three such crises: these two and the real estate investment trust (REIT) crisis in the mid-1970s (Exhibit 2). For its commercial and industrial (C&I) loan portfolio, there were elevated charge-offs from 2001 to 2003 associated with the bursting of the dot-com bubble.

Even though Citigroup has not failed, the consequences of these crises are dramatic. As seen in Exhibit 3, there is a significant negative correlation between the level of provisions established by the bank for loan losses and the profitability of the firm (return on assets [ROA]). Three years define this negative relationship: 1991, 1992 and 2008. The first two represent the final stages of the CRE crisis and 2008 is well known in the current mortgage debacle.

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Exhibit 1. Significant Credit and Market Crises Since 1970



Careful examination of Exhibit 3 reveals a second pattern. The relationship between loan-loss provision and ROA for all other years is essentially flat (cluster of points in the upper left of the graph). That is, provision levels do not appear to affect profitability in these benign periods. This relationship is more pronounced if 2007—the beginning of the current crisis—also is excluded.<sup>2</sup>

Exhibit 3 suggests that, for Citigroup, credit crises have crippled the bank’s profits. Absent these crises, it generates a reasonable return to its shareholders.

any other period due to very low interest rates maintained by the Federal Reserve. The low interest rates allowed banks to capture, as profit, the spread between their cost of funds and the average rate at which they lent.<sup>3</sup>

## Causes of These Crises

Given the importance of credit crises to bank survival and profitability, we ought to ask: “What

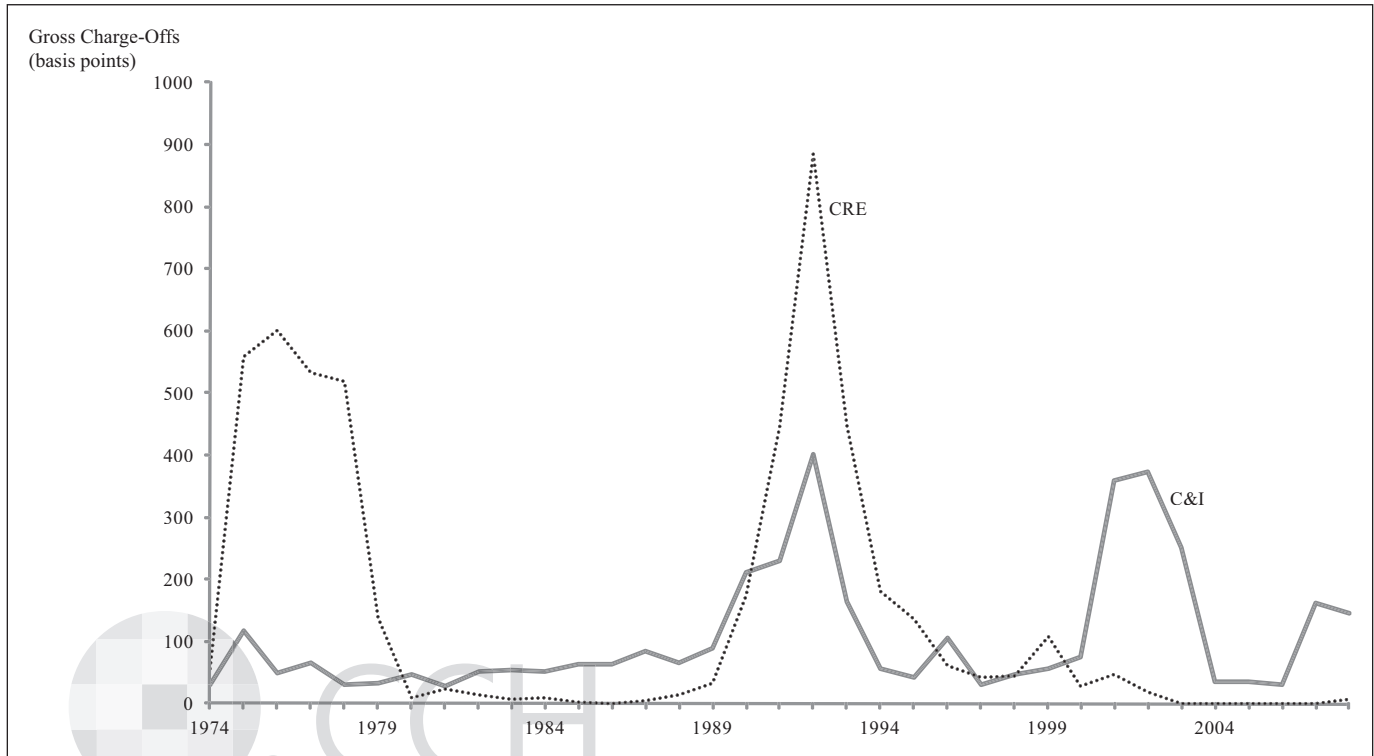
Does this pattern hold for all the banks? The answer appears to be yes.

In Exhibit 4, we plot the same relationship between profitability and loan-loss provisions for all U.S. banks insured by the Federal Deposit Insurance Corporation (FDIC). Several conclusions are evident. First, the years in which there are high levels of loan-loss provisions invariably are coupled with low ROA. Here, we see that the CRE crisis of the late 1980s and early 1990s, the current credit crisis (2008) and the stock market crash of 1987 all had major adverse impacts on the profitability of the commercial banking industry.

Second, these years of extreme losses define the negative relationship between loan-loss provisions and profitability. The more banks must provide for loan losses, the lower will be the ROA in the same year.

Third, absent these extreme years, there is no real relationship between provisions and ROA. Instead, other factors contribute to ROA, including low interest rates. Exhibit 4 clearly shows that the returns for the banking industry in the period 1993 to 2006 were decidedly higher (by upwards of 50 basis points [bps]) than

Exhibit 2. Gross Charge-offs in Commercial Lending Citigroup/Citibank North America, 1974–2008



causes them?” In my judgment, four reasons stand out as significant:

- The inherent business of banking is to be long asymmetric risks.
- Human judgment fails when events are rare.
- “Risk,” as a concept, is defined incorrectly.
- Bankers are compensated only for the limited upside of the risks they take, and they are not penalized for the extensive downside of these risks.

### Banks Take Unhedged “Long” Risk Positions That Are Not Normal in Their Distributions

Most of the risks that banks take and hold do not conform to the commonly understood normal distribution, which is symmetric and bell-shaped. In a financial context, the normal distribution implies that losses are equally likely as are gains and are equally balanced in magnitude. The mean is centered at the point of highest frequency.

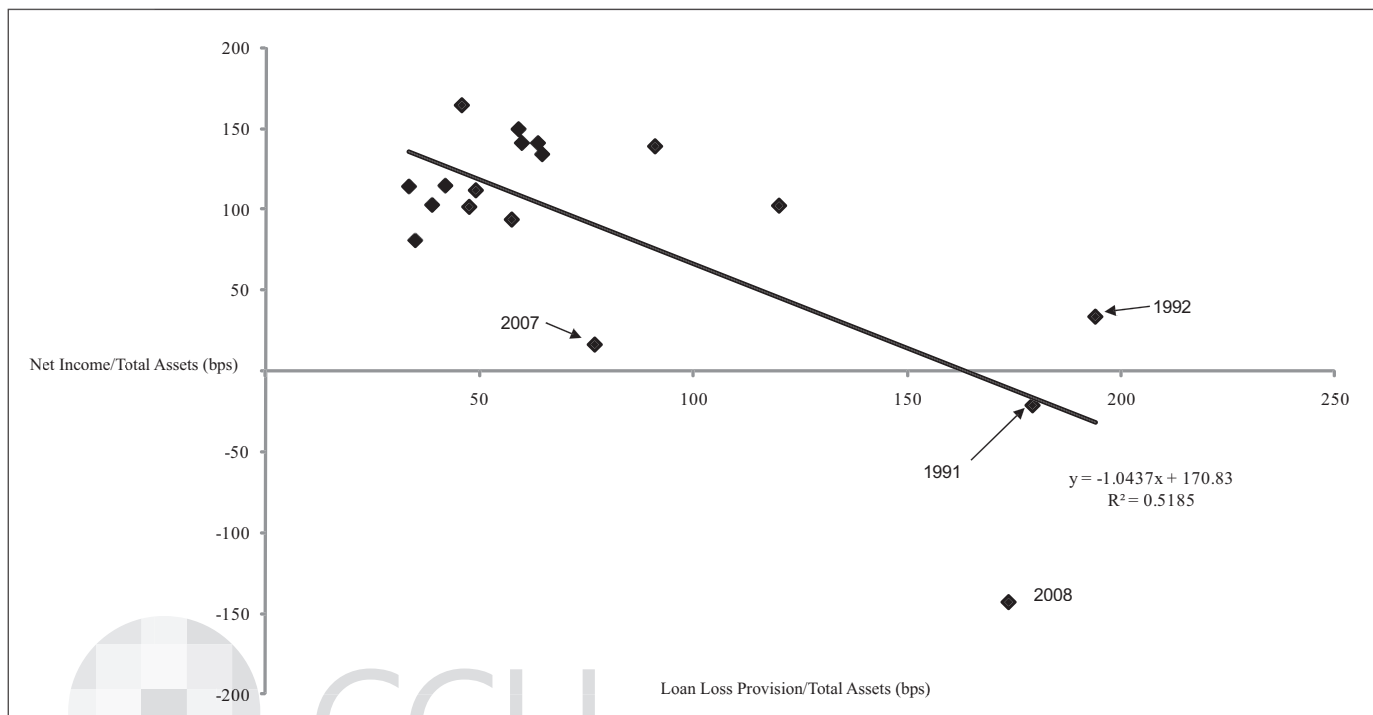
Instead, risks taken by banks that generally are asymmetric and unequal in terms of their likelihood (Exhibit 5) looking nothing like a bell. Such

risks are characterized by small losses that are frequent, large losses that are rare and very large losses that are even rarer. The large losses cause the average of this distribution (expected loss) to be shifted to the right of the point at which losses are most likely.

For commercial lending, large rare losses are those that occur on the far-right “tail”; such losses are “unexpected” because they are uncommon or rare. They also require capital, since capital is the buffer between extreme losses and insolvency of the firm. In recent years, banks have developed the concept of “economic capital,” which is a form of virtual capital meant to protect against these unexpected losses. Specifically, economic capital protects against those losses greater than the expected loss up to the firm’s risk tolerance (which is a high percentile [“99.9x”] of the loss distribution). A firm can, and likely will, become insolvent or bankrupt below this risk-tolerance level so capitalizing to this point prevents insolvency, at least in theory.

Do risks realized by banks actually conform to this theoretical pattern? Yes. As one example, Exhibit 6 shows the historical charge-off rates

Exhibit 3. Profitability and Loan-Loss Provisions Citigroup 1991–2008



for Citigroup's commercial loan portfolios in the United States since 1974. The pattern of losses for this bank matches the skewed distribution in Exhibit 5; in fact, it is slightly more skewed, with small losses (50 bps of charge-offs per annum or less) accounting for 35 percent to 55 percent of all annual losses. Extreme losses (for example, 500 bps or more) occur in "only" five percent to eight percent of all years.

Importantly, the extreme loss events that contribute to the long right-hand tail occur in real estate, specifically the CRE crisis of the early 1990s and the REIT crisis of the mid-1970s. These years are the same ones that define the relationship between bank profitability and loan-loss provisions (Exhibit 3). These "tail" years are the ones in which all the bad things happened: high provisions, high charge-offs and low ROA.

Exhibit 7 displays the default rates for issuers of corporate bonds in the United States. The highly skewed pattern again belies the normal distribution. Importantly, the credit crisis of 1990 to 1991 shows up in the tail of the bond default data just as it does in Citigroup's charge-off history. In addition, 2001 was a year of both high bond market default rates and high charge-offs in Citigroup's

C&I loan portfolio, associated with the collapse of the dot-com bubble.

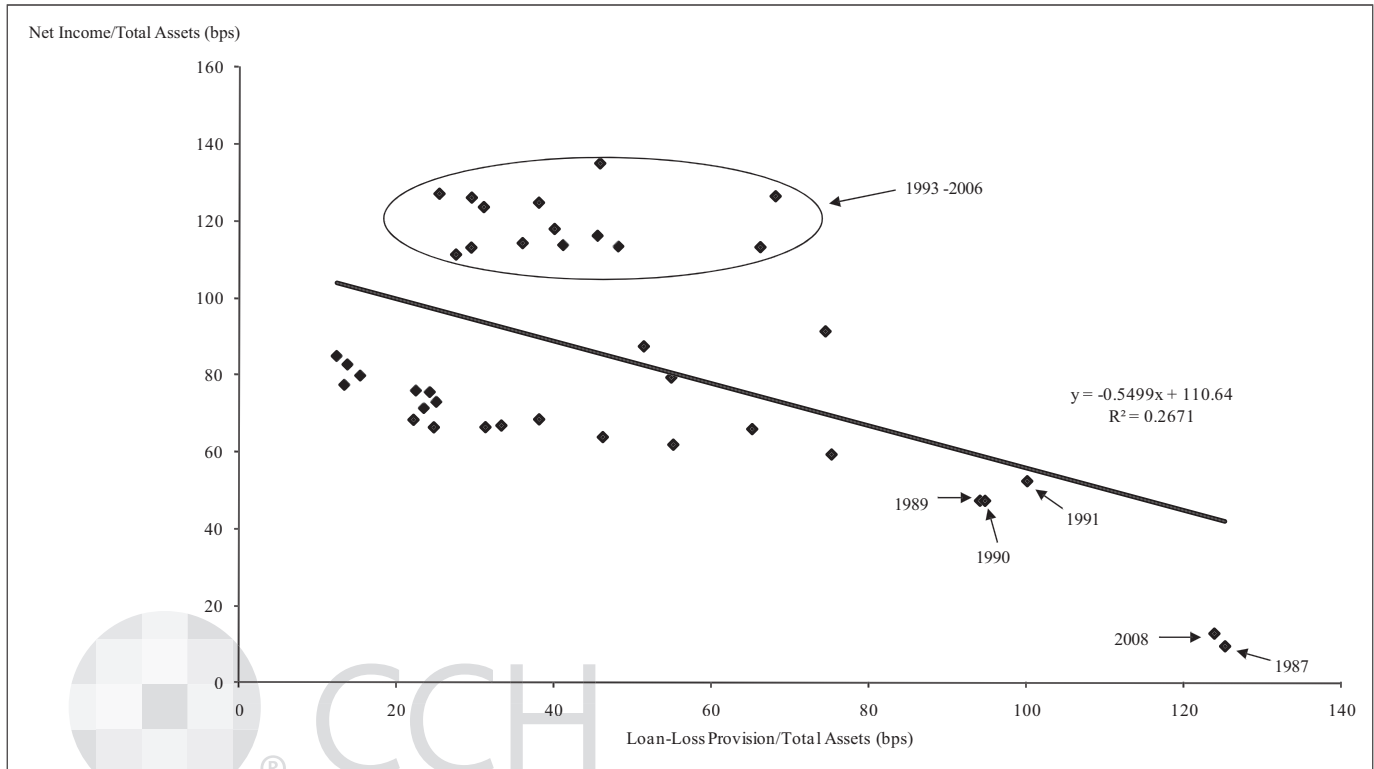
The skewed distribution of defaults and losses, then, is common to commercial banks, especially those engaged in commercial lending. The extreme volatility induced by these tail years becomes a crisis for individual banks or the banking industry because most banks are long credit and market risks and are either unwilling or unable to hedge (that is, go "short") that risk. For example, concentrations of credit on a bank's balance sheet are nothing more than long positions that expose the bank to the episodic and cyclical nature of credit risk.<sup>4</sup> This problem is magnified if the credit that is being concentrated is not investment grade and if the bank is thinly capitalized.

These years of credit crisis are, indeed, the tail wagging the dog of bank profitability and solvency.

### Human Judgment Fails When Events Are Rare

People are very poor judges of probabilities, particularly the probabilities of rare events such as loan default and rogue trading.<sup>5</sup> In fact, there is a lengthy

Exhibit 4. U.S. Commercial Banking Industry FDIC-Insured Commercial Banks 1970–2008



academic literature that demonstrates that computer models predict rare events such as corporate bankruptcy better than do people.

In active, liquid credit markets when there are no bankruptcies, people come to believe that defaults can't or won't occur, even if the long-run historical averages of default are real but small. This is "disaster myopia,"<sup>6</sup> wherein the longer the period since a credit crisis has occurred, the lower the subjective probability that people assign to another crisis occurring. The subjective assessment of risk, of course, can be very different from the actual level of risk.

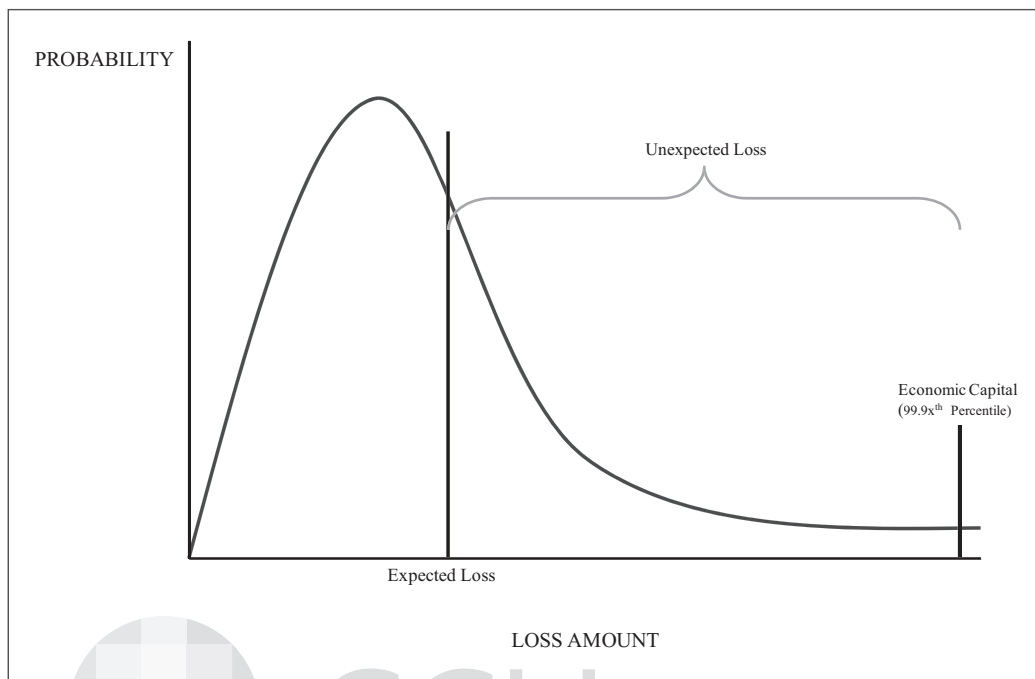
In the benign markets characterized by low losses, people are lulled into a sense that the recent past describes the future and phrases such as "this time it's different" or "the risk premium has permanently moved to a lower level" become common. Such views may be substantiated by changes in macroeconomic conditions. Haldane has noted that, in rising markets with strong economies, credit markets appear to reset to lower levels of default and economic variables, such as gross domestic product, inflation and equity market returns, become less variable.<sup>7</sup>

That is, the economy appears to become more stable at the same time its performance is strong. Of course, a macroeconomic correction that coincides with a credit crisis gives the lie to the idea that "this time it's different."

Disaster myopia is followed by "disaster magnification" that begins when a new round of defaults occurs.<sup>8</sup> Even if the initial level of defaults and losses are small, bankers subjectively magnify them into worse events, cutting lines of credit and tightening underwriting standards. These actions, ostensibly to mitigate or manage risk, can lead to even more defaults and a systemwide crisis.

CRE lending is a perfect example. Loan defaults in real estate markets tend to be concentrated in discrete periods of time interspersed by long periods of low defaults (*see Exhibit 2*), causing bankers to underestimate the true probability of these defaults. When these probabilities fall below a subjective threshold amount, they are treated as zero and disregarded. This disaster myopia causes bankers to underestimate the true risks of real estate lending, particularly if the last adverse event occurred a long time ago.<sup>9</sup>

Exhibit 5. Illustrative Loss Distribution for Asymmetric Risks



## “Risk” Is Defined Incorrectly

Given the long periods between credit crises when disaster myopia takes hold, bankers sometimes forget that defaults occur in waves. As a result, risk at banking institutions is defined by what occurred most recently: yesterday’s mismarked trading position, last year’s loan-loss provision or last month’s credit card frauds. “What’s the risk?” really means “what are

After real estate loans start to default, a disaster magnification takes over as bankers overreact to the defaults that had been seen as unlikely, if not impossible. They overcompensate by overestimating the risk of future defaults. Credit rationing becomes the instinctive response, accompanied by a sharp rise in loan prices and efforts to reduce exposure to real estate. This abrupt reduction in the flow of credit to real estate borrowers puts further deflationary pressure on real estate prices, exacerbating the downward spiral.

Regulators, who are subject to the same psychological responses, may contribute to the magnification by requiring higher capital ratios and larger loan-loss provisions.

Consequently, lending by banks is equally episodic over time, beginning with credit extended to increasingly risky borrowers in the highly liquid, go-go markets characterized by disaster myopia. Such markets end with the extreme losses that incent lenders to withdraw from the market; such “credit crunches,” characterized by disaster magnification, actually cause more defaults when lines of credit are limited or withdrawn.<sup>10</sup> This waxing and waning of lending drive the cycles of lending and loss throughout the banking industry.

we going to lose this year (or quarter or month)?” The expectations of future losses are derived from average losses incurred in the recent past because bankers project their recent experience.

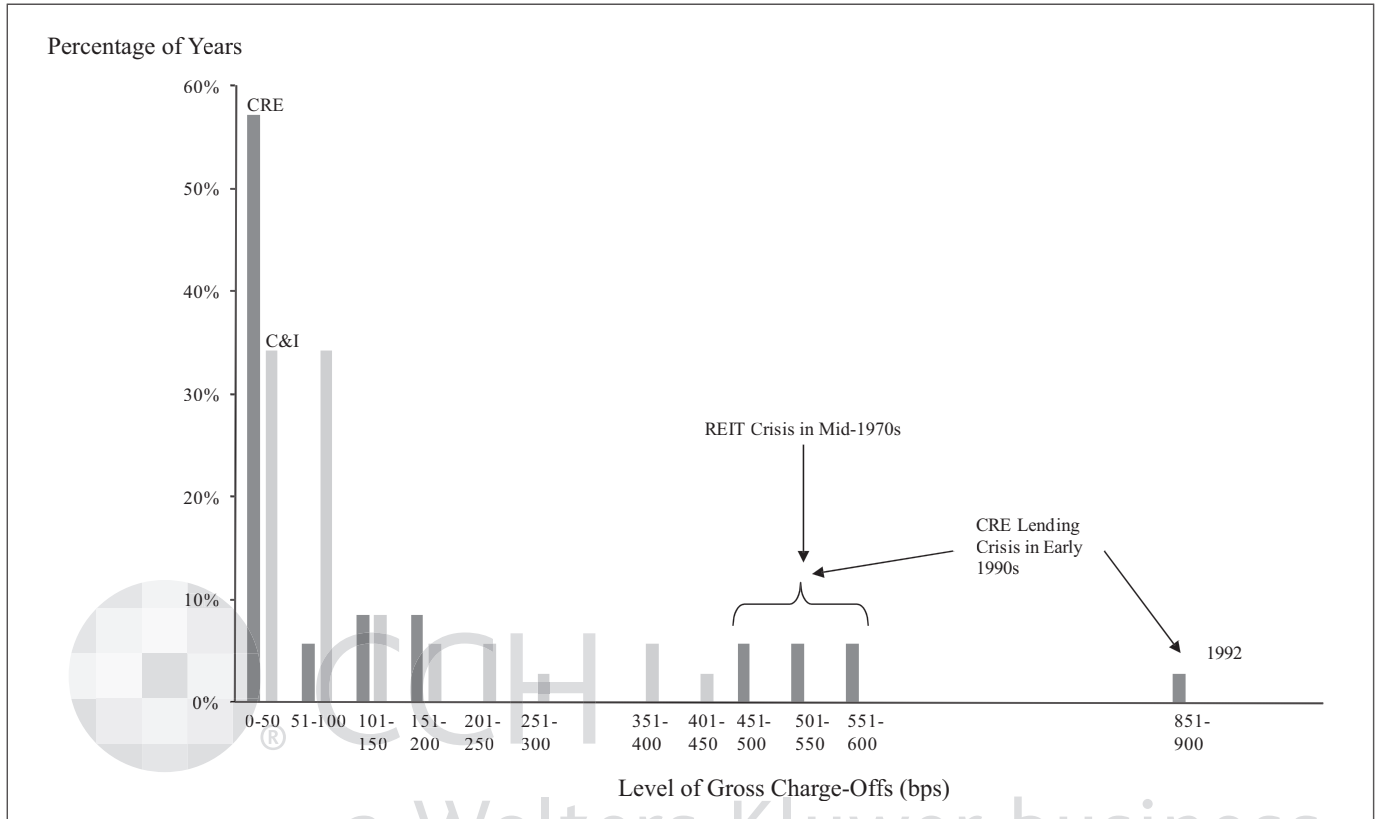
Yet, this is not how risk actually occurs, especially in commercial lending. Defaults by borrowers actually follow a discernible geometric pattern of increasing default probabilities with reduced creditworthiness of the borrower. For example, average annual default rates increase exponentially as the credit quality of the issuer declines from Aaa through Caa (Exhibit 8).

Further, many of the risks undertaken by banks are discrete and not continuous. For example, default of a lending counterparty is a binomial variable, that is, it can exist only in two states. Default either occurs or it doesn’t; there is no intermediate condition. A trader is either honest or not.

It happens that the standard deviation (SD) of default (and, generally, any binomial variable) is given by the formula  $SD = (p * (1-p))^{1/2}$  in which  $p$  = the probability of the event (default). When default is certain ( $p = 100\%$ ) or nondefault is certain ( $p = 0\%$ ), then there is no risk (and  $SD = 0\%$ ). As  $p$  approaches 0.5, then the SD increases toward its maximal value of 50 percent.

Therefore, loans to non-investment-grade counterparties, which have default probabilities between

Exhibit 6. Distribution of Gross Charge-offs in Commercial Lending Citbank, N.A. Domestic U.S. Loan Portfolios, 1974–2008



two percent and 20 percent, are risky because the SD of those default probabilities is very high. They become increasingly uncertain as the default probabilities move from investment grade to non-investment grade (see Exhibit 8).

Some time ago, a colleague and I published an analysis of the reasons for lending crises in the United States.<sup>11</sup> Credit crises are a natural, mathematical outcome of banks lending to non-investment-grade borrowers. These borrowers have both high default probabilities and high variability of default (see Exhibits 6 and 7). Since default is episodic in nature, it merely takes time for non-investment-grade borrowers to default and to default *en masse*.

## Compensation of Bankers Is Not Aligned with Risk

It is widely recognized that bankers are rewarded for taking risk but are not held accountable for the

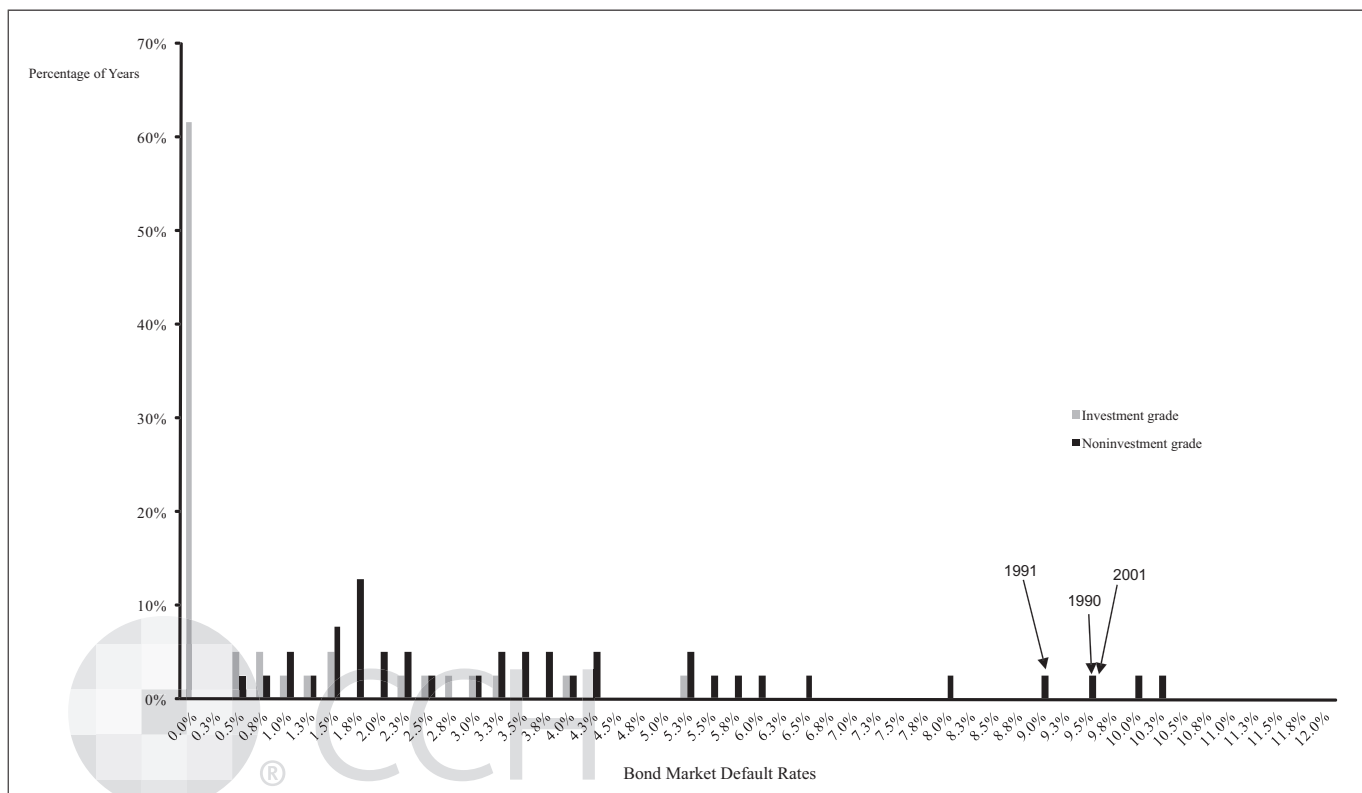
consequences of that risk. In all of the recent credit crises, we observe the following:

- In some instances, the individuals responsible for building risky real estate portfolios are forced to leave their firms once those firms experience losses. Yet, those individuals leave with financial rewards through the triggering of golden parachutes and with lucrative jobs in other firms.
- Bonuses paid by financial firms are generally not linked to the long-term performance of the assets in which the bonus recipients invest.
- Risk managers at banks are paid less than risk takers.

## Persistent Credit Crises Call for New Approaches

Banks that do not actively manage the unexpected losses in their risk portfolios are exposed to extreme risks that occur twice a decade. These banks adopt a passive management strategy in which capital is

Exhibit 7. Distribution of Bond Market Default Rates Moody's Investor Services 1970–2008



the only defense against insolvency. Of course, as reflected in the high rate of bank failures, capital alone is inadequate to prevent such failures in the most extreme market stresses. Even “well-capitalized” banks, per the regulatory definition of the term, can fail quickly,<sup>12</sup> as we have seen in the current crisis.

An essential conclusion of this article is that, absent “tail” crises, the profitability of individual commercial lenders and the industry as a whole is satisfactory. However, in the crises—when the tail wags—profitability can be destroyed quickly. In extreme circumstances, the tail can wipe out bank capital and banks.

Commercial lenders can mitigate, or avoid, the consequences of tail risk events, but such mitigation requires three changes to the management of commercial loan portfolios. First, banks must change their perspectives on risk to understand that the uncertain, large-magnitude losses associated with market crises make or break the profitability of commercial lending and of the whole bank. The risks that kill banks, especially credit risk, are the tail risks.

Second, the management of these risks must entail the active identification of internal or external

circumstances that destroy the profitability of commercial banking and the mitigation of such risks. Specifically, banks must prevent the cycle of disaster myopia and overlending followed by disaster magnification and capital contraction.

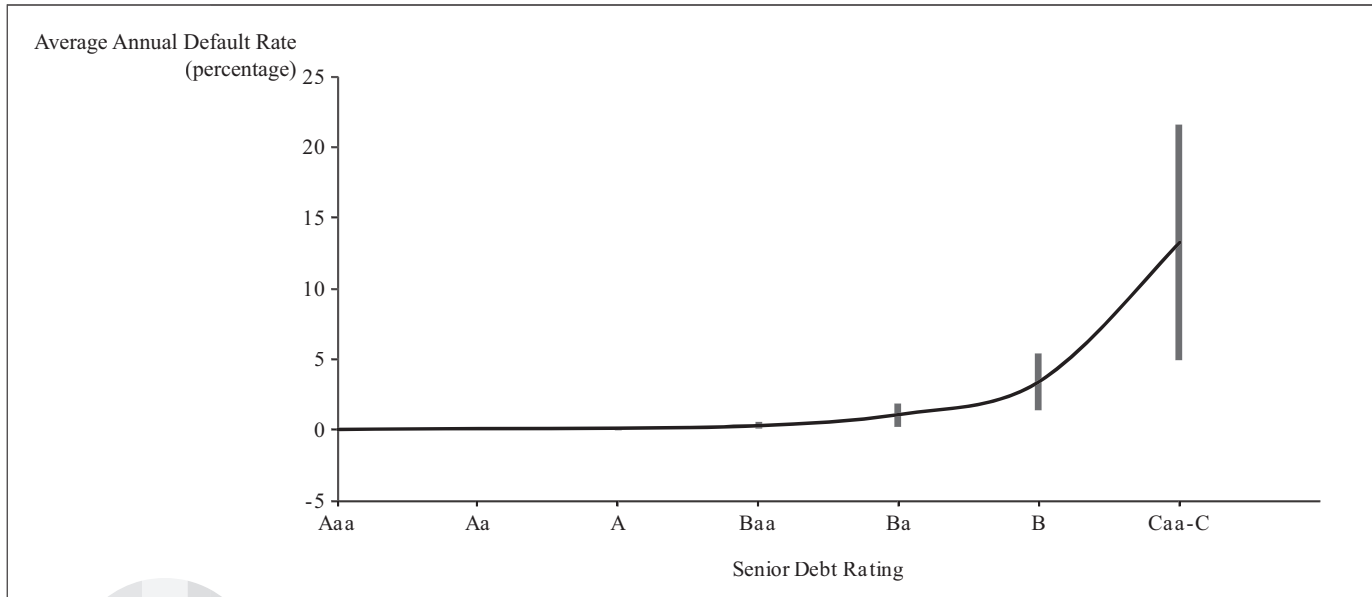
Third, bankers must recognize that, sometimes, it is better to stop lending and temporarily exit the business. Lending aggressively at the height of the market exposes the commercial lender to all of the risks that are destructive to the bank.

## Endnotes

- <sup>1</sup> In August 1991, Congressman John Dingell of Michigan asserted that Citigroup was technically insolvent due to losses incurred in the CRE crisis of the late 1980s and early 1990s.
- <sup>2</sup> If 1991, 1992 and 2008 are excluded, there is no relationship between ROA and provision/assets ( $ROA = -0.1158 \times \text{provision/assets} + 120.85$ ;  $r^2 = 0.0056$ ). Similar results occur if 2007 is excluded, as well.
- <sup>3</sup> The period 1993 to 2006 is different from all other years. The average ROA in 1993 to 2006 (119.7 bps) is nearly twice the average ROA of all other years (65.3 bps), a statistically sig-



Exhibit 8. Average Historical Default Rates Moody's Investor Service, 1920–2008 U.S. Corporate Bonds (Mean and Standard Deviation)



nificant difference ( $p < 0.05$ ). Further, in this period, there is no relationship between ROA and provision/assets ( $ROA = 0.0034 \times \text{provision/assets} + 119.53$ ;  $r^2 = 0.0000$ ). In all other years, a relationship does exist ( $ROA = 0.4499 \times \text{provision/assets} + 87.99$ ;  $r^2 = 0.6240$ ).

- <sup>4</sup> B. G. Stevenson, *Managing Credit Concentrations: Policies and Practices for Achieving Balanced Portfolios*, COMMERCIAL LENDING REV., Fall 1994, at 14–23; B. G. Stevenson and M. F. Fadil, *Research Report: Why Lending Crises Occur So Frequently*, 77 J. COMMERCIAL LENDING 3 (1994), at 43–49.
- <sup>5</sup> See, e.g., H. Kunreuther and M. Pauly, *Neglecting Disaster: Why Don't People Insure Against Large Losses*, 28 J. RISK & UNCERTAINTY 1 (2004), at 5–21; see also R. Hertwig, G. Barron, E. U. Weber and I. Erev, *Decisions from Experience and the Effect of Rare Events in Risky Choice*, 15 PSYCHOLOGICAL SCIENCE 8 (2004), at 534–39.
- <sup>6</sup> See J. Guttentag and R. Herring, *Commercial Bank Lending to Less Developed Countries: From Overlending to Underlending to Structural Reform* (BROOKINGS DISCUSSION PAPERS IN INTERNATIONAL ECONOMICS 16, Brookings Institution, Washington, D.C., 1984); see also R. Herring and S. Wachter, *Bubbles in*

*Real Estate Markets* (working paper no. 402, Zell/Lurie Real Estate Center, Wharton School of Business, University of Pennsylvania, 2002).

- <sup>7</sup> A. G. Haldane, *Why Banks Failed the Stress Test* (Presentation to the Marcus-Evans Conference on Stress-Testing, London, Feb. 2009).
- <sup>8</sup> Herring and Wachter, *supra* note 6.
- <sup>9</sup> In 1989, I was asked to build a default prediction model for Citbank's CRE loan portfolio. A senior lender told me that such a model wasn't necessary since annual charge-offs in the portfolio over the preceding eight years averaged less than 10 bps. For him, CRE loans didn't default though Exhibit 2 says otherwise.
- <sup>10</sup> B. G. Stevenson, *Research Report: Capital Flows and Loan Losses in Commercial Banking*, 77 J. COMMERCIAL LENDING 1 (1994), at 18–26; B. G. Stevenson, *Capital Flows and the Cycles of Losses in Commercial Real Estate*, 25 REAL ESTATE REV. 2 (1995), at 34–42.
- <sup>11</sup> Stevenson and Fadil, *Research Report*, at 43–49.
- <sup>12</sup> J. Peek and E. S. Rosengren, *How Well Capitalized Are Well-Capitalized Banks?* NEW ENGLAND ECONOMIC REV. (Sept./Oct. 1997), at 41–50.

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