CHAPTER 1

Credit Risk

The Great Challenge For The Global Economy

Moderate leverage undoubtedly boosts the capital stock and the level of output . . . the greater the degree of leverage in any economy, the greater its vulnerability to unexpected shortfalls in demand and mistakes.

—Alan Greenspan, Board of Governors of the Federal Reserve System, 2002

In recent decades, credit risk has become pervasive in the United States and throughout the world. The U.S. Treasury borrows to keep the federal government afloat, and local water districts borrow to construct new treatment plants. Corporations borrow to make acquisitions and to grow, small businesses borrow to expand their capacity, and millions of individuals use credit to buy homes, cars, boats, clothing, and food. The dramatic growth in U.S. borrowing by all segments of the society is illustrated in Figure 1.1, which suggests the scale of this credit explosion.

An element of credit risk exists whenever an individual takes a product or service without making immediate payment for it. Telephone companies and electric utilities accept credit risk from all their subscribers. Credit card issuers take this risk with all their cardholders, as do mortgage lenders with their borrowers. In the corporate sector, businesses in virtually every industry sell to customers on some kind of terms. Every time they do so, they accept credit risk. The credit risk assumed may be for a few hours or for a hundred years.

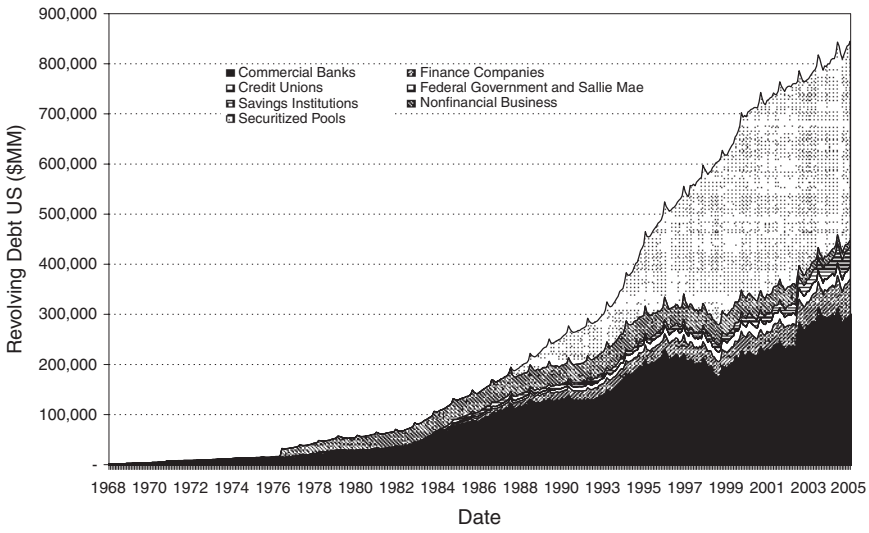

FIGURE 1.1 Revolving Debt in the United States, 1968–2006
Source: Federal Deposit Insurance Corporation (2006).

Meanwhile, the use of credit became a major factor of other countries as well. Europe has seen a significant increase in leverage by corporations and individuals, particularly in Britain where the patterns are similar to those in the United States. Emerging markets have also joined the bandwagon as both countries and their corporations and individuals have come to see credit as a powerful tool for economic progress. Meanwhile the capital markets have provided many more ways for these institutions and individuals to borrow.

CHANGING ATTITUDES TOWARD CREDIT

The credit explosion has been accompanied—and accelerated—by a dramatic shift in public attitudes. When Shakespeare's Polonius advised his son, "Neither a borrower nor a lender be," he was voicing the wisdom of his time. He reasoned that "loan oft loses both itself and friend, and borrowing dulls the edge of husbandry." Such advice—whatever its merits were in the Elizabethan age—has been drowned out by the contrary opinion. And Polonius may have been wrong about friends, too. Banks continue to court borrowers who caused them to lose money in the past! And if borrowing

dulls the edge of husbandry, no one seems to mind. Any shame that once attached to the use of credit has vanished.

Even the words we use to describe credit reflect a major shift in attitude. The word *debtor* still carries connotations of misery and shame—an echo of Dickensian debtors' prisons. The word *borrower,* likewise, may still call to mind a pathetic figure going hat in hand to a powerful and possibly scornful banker. But today, we no longer need to see ourselves as debtors or borrowers. We can think of ourselves as people using *leverage*—a word with entirely different connotations. *Leverage* suggests that we are clever enough and skillful enough to employ a tool that multiplies our power. And using leverage leaves the rest of our identity intact—we do not become *leveragors* in the same way that we become debtors. Using leverage is something to boast about, not something to conceal. Today many people see credit as an entitlement.

From many directions, in fact, Americans are bombarded with invitations to increase their borrowing. Automobile manufacturers attract buyers with low rates on auto loans and offer leases with easy terms to customers who cannot afford a down payment. Retailers entice consumers to open charge accounts by offering discounts on their first purchases. Credit card issuers cram Americans' mailboxes with competing offers. Even credit-impaired individuals—those who once sought the protection of the bankruptcy court—are soon viewed as good credit risks because they are now debt free (*Philadelphia Inquirer* 1996, D-1). Indeed, if there is still shame in any type of consumer transaction, it currently attaches to cash. Many may have seen recent commercials from Visa regarding the use of cash by a customer as slowing down the progress of purchasing in a busy market circumstance. The merchant who insists that you pay for a purchase in cash may well be impugning your integrity.

This shift in attitude is just as visible in the commercial sphere. CEOs and CFOs are paid handsomely to find other people's money for their companies to leverage. The stock market, which shows little taste for underleveraged companies, exerts steady pressure on public companies to put an appropriate level of debt on their balance sheets. Meanwhile, pension funds and insurance companies are the major investors in hedge funds and private equity firms who vie with one another to lend money to finance leveraged buyouts.

High-yield (or junk) bonds have existed for decades, but they were once symptomatic of "fallen angels"—formerly prosperous companies whose fortunes had declined. Today, however, issuing junk bonds is seen as a perfectly respectable strategy for companies lacking access to lower-cost forms of credit.

Even bankruptcy—at least the Chapter 11 variety—has lost much of its sting. Once avoided as a shameful and potentially career-ending debacle,

bankruptcy is now widely accepted as a reasonable strategic option. Many companies have sought Chapter 11 bankruptcy as a way to obtain financing for growth, to extricate themselves from burdensome contractual obligations, or to avoid making payments that they deemed inconvenient to suppliers, employees, or others. Meanwhile, individuals who choose personal bankruptcy know that their credit can be resurrected in a mere 10 years—or as little as three to five years if they have completed a repayment plan under a Chapter 13 filing (U.S. Courts, *Bankruptcy Basics*). Meanwhile in the United Kingdom, the Enterprise Bill 2002 enables a first-time bankruptcy to be discharged after only one year.

The spectacle of Orange County's financial woes suggests that attitudes toward bankruptcy have changed in the public sphere, too. Neither the county's population nor its leaders showed much embarrassment or sense of urgency when it defaulted on its obligations in 1994 because of losses exceeding $1.6 billion that it had suffered in derivative "investments." Apart from front-page stories like this, credit quality, as assessed by the rating agencies, has followed a downward trend in the public finance market. At the same time, state and local government entities have accessed the public debt market in growing numbers over the past 35 years. Seventeen states had a triple-A credit rating in 1970. Just nine states could lay claim to this distinction in 2006 (Moody's and S&P reports). The causes for the erosion of municipal credit quality—taxpayer revolts, mismanagement, and, in the cities, declining tax revenues and inflexible labor costs—may be endemic to the municipal arena, but the decline is in keeping with trends visible in the corporate market, too.

Attitudes towards the use of credit and the importance of maintaining a reputation as a conservative and careful borrower have changed. For example, California, our largest state, and the world's sixth largest economy, is a particularly interesting case. Triple-A rated in the early 1990s, the state's GOs (general obligations) began a drop in the mid-1990s to AA and then into freefall in 2001–2003 to reach Baa before a more recent uptick to A1. Similar attitudes in the corporate sector are evident such as when U.S. Air went bankrupt simply to renegotiate long-term leverage uses of aircraft.

MORE NATIONS BORROW

The appetite for borrowing is truly global in scope. Sovereign obligors have come to the international financial markets in ever-greater numbers. Figure 1.2 shows the growth in rated sovereign borrowers in the period 1975–2006.

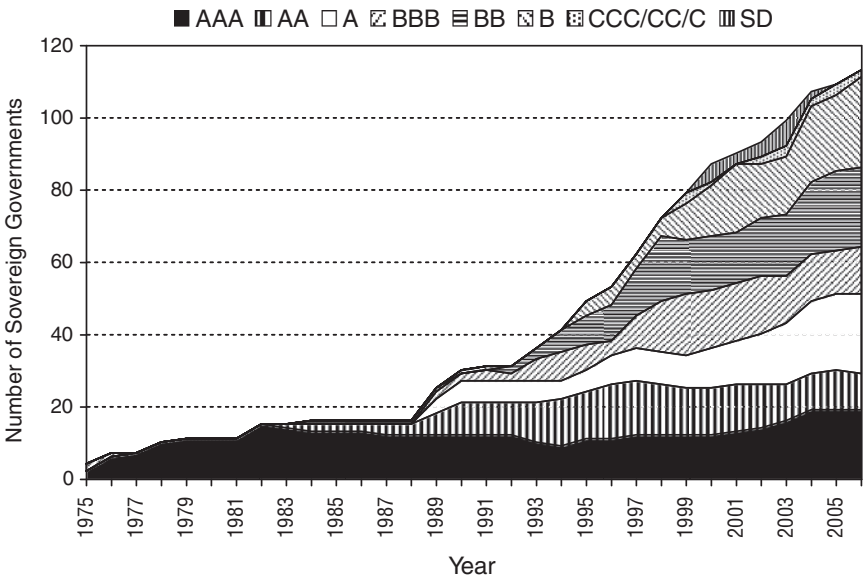

FIGURE 1.2 Sovereigns Rated by Standard & Poor's, 1975–2006
Source: Standard & Poor's *The Future of Credit Ratings* (2006).

What is particularly interesting in this table is the growth in the number of countries that now are rated by the global rating agencies. This is a clear indication of the importance of access to the capital markets by countries all over the world. As Figure 1.3, Figure 1.4, and Figure 1.5 show, developed countries have increasingly relied on public and private debt.

A new trend in many other developed and developing countries is privatization. Traditionally, infrastructure projects such as roads or bridges were financed by the government. This is changing rapidly. In the United Kingdom, for example, under the Private Finance Initiative, major projects, and even defense-related activities, are being shifted to private sector operators under long-term contracts remunerated by service charges. This trend has accelerated into the European Union, Australia, and in the United States.

Deregulated domestic financial institutions and corporations in emerging markets have been able to tap into foreign capital to finance domestic growth.

In emerging economies, the growth in borrowing is not limited to corporations and governments. Consumers in many regions are quickly learning how to pay with plastic. In developing countries from Argentina to Thailand, credit card debt is rapidly expanding.

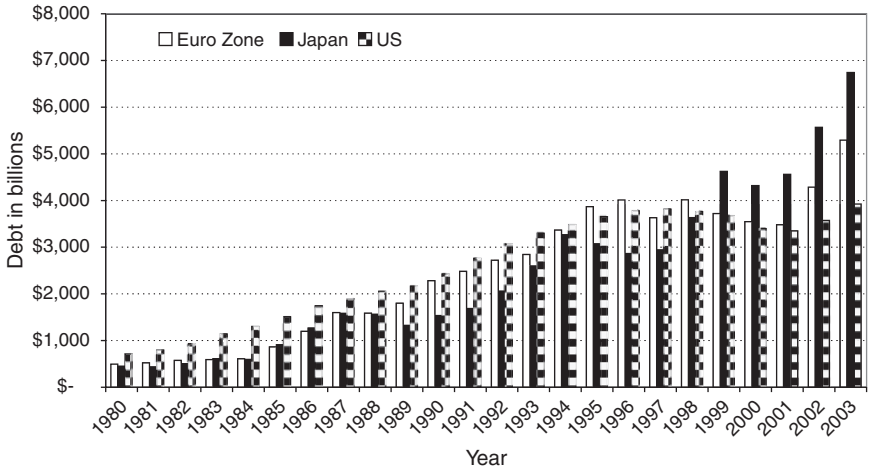

FIGURE 1.3 Public Debt in Developed Economies
Source: Organisation for the Economic Co-operation and Development (2006).

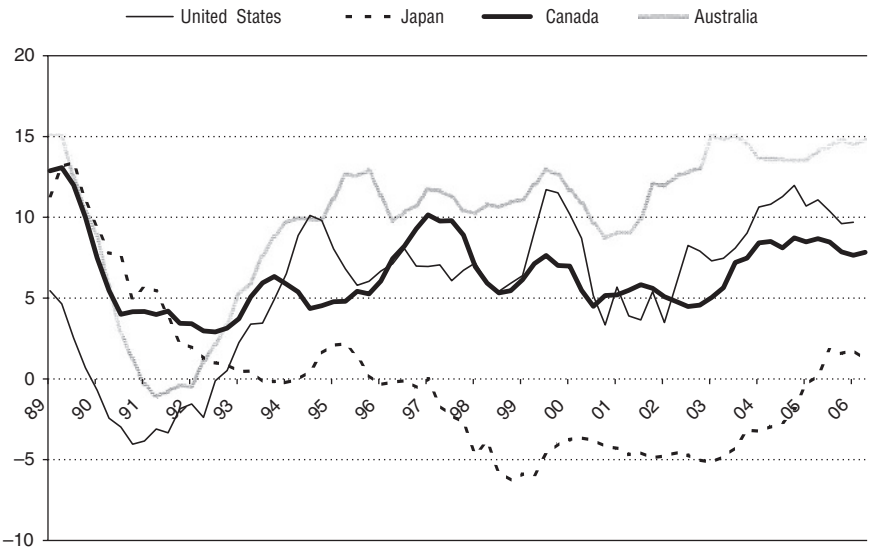

FIGURE 1.4 Credit Growth (private domestic credit)
Source: Bank for International Settlements, *Annual Report 2007*.

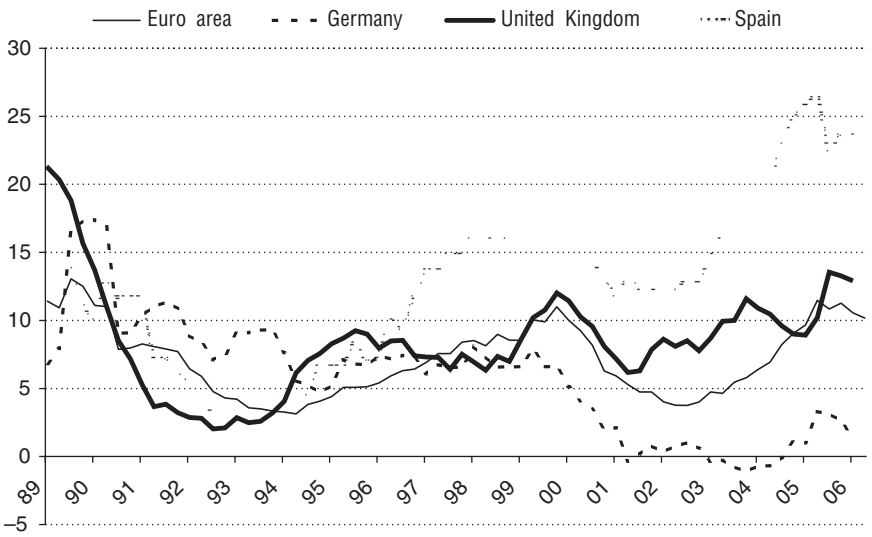

FIGURE 1.5 Credit growth in Europe (private domestic credit)
Source: Board of Governors of the Federal Reserve System (2006).

MORE LEVERAGE, MORE OPPORTUNITY, AND MORE RISK

Without question, the availability—and acceptability—of credit facilitates modern life and fuels the economy. Credit enables individuals of even modest means to buy homes, cars and consumer goods, and this, in turn, creates employment and increases economic opportunity. Credit enables businesses to grow and prosper. Governmental agencies all over the world use credit to build infrastructure that they cannot fund from annual budgets. In the United States, the municipal bond market is huge, allowing states, cities, towns, and their agencies the meet the public's needs for schools, hospital, and roads.

Hermando de Soto in his book *The Mystery of Capital* has argued that the ability to leverage for both individuals and commercial enterprises is the most important factor in understanding why some economies are developed and others are not. In the United States, we have taken this leveraging concept to new levels and Europe is not far behind. The economies in the United States and in Europe have become both large and diversified. This means that leverage is needed to marshal the investment required to operate the economy and to develop new products and services. The diversification

of the economies—which is a huge change from what existed 100 or even 50 years earlier—makes the economies much more stable and therefore much less risky from a systemic basis. So it should be no surprise that the credit markets in the developed world have grown to massive proportions and that countries in the developing world are looking for ways to emulate it.

The credit markets clearly have grown. We are more leveraged than we used to be. Credit facilities are on offer everywhere. Whether you are a treasurer looking to finance a new business, a local government wishing to build a new school or an individual hoping to buy a new home, you have many options available to you. Many more options than you would have had just a few years ago. Many observers of this phenomenon see big risks inherent in this situation. Warnings of upcoming doom are familiar topics in our newspapers and the subject for more than a few books. But most of the doomsayer's just point to the fact that the credit markets have grown dramatically and that consumers, corporations, and governments are all more dependent on leverage. We would not question the facts. We are more leveraged. Whether an inherent problem, or the natural outgrowth of our capitalist economic system, it poses an interesting question. One thing for sure is that we need excellent credit management skills to help us operate in this environment.

To understand whether this increase is leverage is bad or good requires an analysis about how it has come about. Credit can grow rapidly for three reasons:

1. *Financial deepening*. This occurs when credit is extended to those who were not eligible before, or when those who are eligible use the credit markets more extensively to invest in inventory or capital equipment. Examples of the former would be the extension of the mortgage markets, credit cards, and auto finance to many people who probably were ineligible in the past. Another example would be in small business credit, or when borrowers in less developed economies gain access to the global capital markets. At the grass roots level, microfinance in emerging markets is yet another example of financial deepening. Most of the aggregates we see in the expansion of credit levels are the result of financial deepening and are a good thing for the most part.
2. *Normal structural upturns*. More growth in the global economy means more credit gets expended. We have experienced an unprecedented growth period over the past few decades, so it is natural that credit would have grown along with it. There is also a multiplier effect, because of financial deepening credit actually grows faster than GDP, normally by a factor of 1.75 times according to research done by S&P.

3. *Excessive structural movements.* This is where the credit expansion becomes a credit boom that is potentially destabilizing. Asset prices get magnified—stock prices shoot up, real estate prices boom, and banks are tempted to lend more against inflated asset values. This is what often is referred to as a *bubble.* Much of the popular press today would argue that this is exactly the situation currently faced by the United States and most of the global economy.

What we know for sure is that credit has been expanding at a rapid pace. We can also observe that this expansion is happening at a time when credit management tools have improved and information sources are significantly better than they were just a few years ago. Attitudes toward debt, amongst both borrowers and lenders have changed, also probably for the better as many of the players are approaching the markets with a much higher level of sophistication. The main lenders are much more skillful than they were when we wrote the first edition of *Managing Credit Risk*.

In the early months of 2007 it appeared that the credit markets were in some sort of new paradigm driven by the improvement of credit management tools coupled with a stable economic situation. At the end of 2007 we appear to be on the edge of a precipice, a few additional missteps away from a major global recession created by a crisis in the credit markets. How this will play out is hard to say with any certainty. However, what is certain is that the higher levels of leverage do make individual players and the economy as a whole, more vulnerable to some kind of systemic back up. It may be that the high levels of diversification, the fact that there are many more risk takers in the markets, and everyone has more information, may make this current credit downturn more limited in the end. But we can now see very clearly that we have not seen the last of credit cycles.

Before we leave the discussion of more debt and more risk, there is one additional risk that has arisen from the new credit markets. Credit has always been a personal idea. At the core of most good credit guidelines is the idea that the lender needed to know the borrower. Banks only lent to their good customers. Customers they nurtured over long periods of time. From this came a familiarity and trust between lender and borrower. When things changed and the borrower needed some adjustments to their credit line, or more money, or more time—the adjustment often took place with a minimum of stress. All of this was not good, of course. Relationship banking brought a lot of damage to the banking systems in many countries. But it did provide stability and a clear path for individuals and corporations when they faced some problem. They called their banker and had a discussion. Today it is not so simple. Few banks hang on to the loan that they make. When

problems arise it is not so easy to make adjustments. If major problems occur things could get even more difficult. Who do you turn to then?

THE GOLDEN AGE OF BANKING

The decade of 2000 was beginning to look more and more like a golden age in global banking until the recently escalating subprime crisis. Even the low profit and relatively higher risk banking markets of Japan and Germany have rebounded from low payments earlier in the decade. We believe that structural improvements—resulting from global consolidation, improved risk management, tightening of costs, and lighter regulation—position the industry well to ride out a number of future risk scenarios such as a sharp rise in long-term interest rates or external systemic shocks.

While the banking industry has made great adjustments from the 1990s, credit risk is still a serious challenge today, but for other reasons. Major lending institutions such as commercial banks and insurance companies are no longer the dominant source of credit to the global economy. They still have a critical part to play, particularly in the creation of credit instruments but they no longer dominate the field by holding on to the credit instruments. This means that there is a disconnect between the creator of the debt from the holder of the debt from the debtor. This disconnect is a growing concern to regulators and major participants in the credit markets as it may produce much more volatility when the credit cycle becomes more challenging.

Despite the significant improvements made by banking institutions over the past decade, the events of the not-too-distant past have demonstrated that the judgment of bankers is far from infallible. American banks have made serious errors in lending from time to time. While several factors converged to produce the recent bank crises, an inadequate credit policy and/or process was surely one of the most important. In lending to Latin American countries in the 1970s and to commercial real estate developers in the 1980s, banks based their decisions on their traditional credit methodology: They evaluated individual risks, and they focused on lending to customers with whom they had longstanding business relationships. These techniques failed them badly. In Latin America, as in the commercial real estate market, banks got into trouble because they selected the wrong sector, not because they chose the wrong individual risks. Some of the problems may be blamed on poor bank management, but even good management by itself does not make credit risk go away.

The collapse in the Asian economies (Thailand, Indonesia, Malaysia, and South Korea) was reminiscent of the way Latin American borrowing grew in the early 1980s, the causes of the financial crises in these two

instances were different. In the Latin American case, according to Jack Guenther, formerly senior vice president of, Country Risk at Citibank, many of the difficulties experienced by those countries were due to external shocks, such as sharp declines in world commodity prices and high interest rates following the restrictive monetary policy pursued by the United States to control inflation at home. With the Asian economies, the problems were caused, on the one hand, by an asset bubble in real estate, and, on the other, by excessive investment in productive capacity and decline in export growth. Moreover, the collapse itself was accelerated by pessimistic sentiments in the financial markets and the flight of short-term foreign capital. The Asian countries with one or two exceptions (e.g. Philippines) have by and large rebounded from this crisis.

CREDIT RISK PRICING IS NOW MARKET-DRIVEN

When the first edition of *Managing Credit Risk* was published in 1998, it was easy to make the case that credit risk was underpriced. There was clear evidence that U.S. banks had systematically underpriced credit risk to their commercial customers. And the pricing policies of these banks looked sensible in comparison to what was happening elsewhere in the world. It seemed like a great time to be a borrower from one of these institutions. The reasons for inadequate pricing were varied: Banks in many countries viewed themselves as a type of utility—their job was to funnel the nation's savings into economic development, not necessarily to make money on the process. Many banks treated commercial loans as a "loss leader" that induced customers to purchase other, more lucrative products from them. Exacerbating the problem was that these institutions lacked good default and recovery data regarding their own lending experience. In the absence of knowledge and information, they did what they could.

Ten years later the situation could'nt be more different at the major global lending institutions. Much more data is available and the major banking regulators have created a risk-based capital system that makes it very clear to banks what the capital consequences are when making a loan to their customers. All evidence would suggest that the markets are much more sophisticated than they were a decade earlier. It also seems that there is more systemic risk to worry about. So what happened to credit spreads in this new world of finance? They collapsed. Spreads became tighter than ever and reached a low in the summer of 2007. So was credit risk underpriced then? Maybe it was, but perhaps not.

It can be said that there is a whole new paradigm at work here. Ten years ago the banking systems were the primary sources of long-term credit

provision. That is no longer the case, no matter which market you look at. So we have new lenders, with new economic models to work from and even quite different motivations. In some respects, credit risk should be similar to any other commodity service. Pricing of any commodity is a function of three things:

1. The cost of providing the service.
2. Expected and unexpected losses associated with the provision of the service.
3. An acceptable return on the capital required.

So what is the new paradigm? Whereas credit spreads used to be set by bankers based on a mixture of cost analysis, customer relationships, and some good old-fashioned "country windage," they are now set by the market. By June 2007, we had gone through a long period of low defaults, some distinct changes in the flow of funds, and huge surpluses of liquidity from traditional and nontraditional sources. There were many new savers (such as the Chinese who are believed to hold almost a trillion dollars of U.S. Government obligations) and new managers of the savings. Cash, which used to sit in a bank deposit, is today in a mutual fund or in a hedge fund. Credit risk had essentially "followed the money." The new players have a completely different cost base (mostly lower), smaller capital requirements (if any) and a limited and largely more positive experience to price from. So it was not surprising that credit spreads in mid-2007 would be dramatically lower than they had been in some time. Indeed, in some markets, for example, in the U.S. high-yield bond market, spreads were the lowest ever. However, new information regarding the riskiness of the market began to become apparent to all participants in the summer and fall of 2007. The market processed this new information and spreads rocketed predictably. By the fall of 2007, many market players were no longer interested or willing to participate in the market and market spreads increased from record lows to above average in just five months! This repricing of credit risk, while painful to many, was cheered by those who felt that despite the "new paradigm" of market structures, the basic risk assessment of credit was out of line in June 2007. The message was quite clear. The new market paradigm is that credit spreads are now a function of market supply and demand pressures as well as fundamental default and loss expectations. They incorporate information on credit as well as the fears and expectations of the participants. As a result, we can expect market pricing for credit risk to be highly volatile going forward.

Market participants are now much more sophisticated when it comes to pricing credit risk. In recent times, many lenders could see that the

market was underpricing credit. Their response was to continue to originate credit but not to hold it. That wasn't illegal or improper, it was just smart business.

CREDIT MANAGEMENT IS IMPORTANT TO THE GLOBAL ECONOMY

Every major economy and most developing countries have experienced credit problems in their banking systems, which have had a negative effect on economic growth and financial market stability. Previously, we referred to the U.S. problems of the past 30 years that arose from real estate lending and other problems. European banks have experienced banking crises comparable to those in the United States. Major banks in France, Spain, and the United Kingdom have come close to failure in recent years. The German banking system is in a turmoil served up by systemic credit failures. Elsewhere the story is not much better. Problems in the Japanese banking system dominated the financial press for nearly a decade and set off a long period of deflation and recession for the Japanese economy. Table 1.1 shows the profitability of major banks in the industrialized nations of the world for the period 2002–2004.

Serious problems in the economies of Thailand, Korea, Malaysia, and Indonesia were a direct result of problems in their credit markets. So it is no wonder that the central bankers of these countries have come together to set rules designed to insure that good credit practices and adequate capitalization is a feature of the banking systems.

NEW TRANSACTIONS, NEW RISKS

The emergence of new kinds of financial transactions has also created greater awareness of credit risk. Financial derivatives such as interest-rate or currency swaps represent the unbundling of market risk and credit risk. An interest rate swap, for example, is typically a transaction between the following two parties: (1) a highly rated issuer that prefers floating rate obligations but can raise fixed rate debt at a relatively low rate; and (2) a lower-rated issuer that prefers fixed rate obligations but can raise only floating rate funds. Thus, a major share of the more innovative swap deals actually turns on credit risk, and it is by accepting credit risk that swap sellers derive a great proportion of their revenues.

Derivatives expand the concept of credit risk to include counterparty risk. Suppose, for example, that automaker A agrees to swap currencies

TABLE 1.1 Profitability of Major Banks, 2002–2004

	Number of Reporting Banks	Percent of Total Average Assets											
		Pretax Profits			Provisioning Expenses			Net Interest Margin			Operating Costs		
		2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004
United States	12	1.89	2.10	1.99	0.84	0.47	0.36	3.45	3.21	3.12	3.28	3.16	3.48
Canada	5	0.61	1.00	1.19	0.58	0.23	0.06	2.07	1.99	1.92	2.75	2.78	2.77
Japan	11	−0.55	−0.47	0.29	1.14	0.75	0.56	1.13	1.21	1.11	1.20	1.35	1.12
Australia	4	1.49	1.49	1.46	0.26	0.21	0.17	2.16	2.13	2.05	2.04	2.30	2.55
United Kingdom	9	1.06	1.22	1.15	0.37	0.33	0.23	2.15	1.96	1.56	2.26	2.04	2.07
Switzerland	5	0.12	0.59	0.68	0.15	0.03	−0.01	1.02	0.97	0.82	2.55	1.96	1.65
Sweden	4	0.69	0.77	0.98	0.09	0.10	0.03	1.48	1.44	1.35	1.44	1.37	1.24
Austria	2	0.46	0.53	0.69	0.39	0.36	0.31	1.80	1.71	1.80	1.92	1.85	1.84
Germany	9	−0.01	−0.12	0.09	0.48	0.30	0.15	0.80	0.81	0.71	1.37	1.26	1.35
France	7	0.45	0.59	0.09	0.15	0.17	0.08	0.62	0.80	0.72	1.49	1.50	1.41
Italy	6	0.67	1.03	0.67	0.91	0.68	0.49	3.07	2.82	2.24	3.33	3.22	2.73
Netherlands	3	0.46	0.65	1.03	0.26	0.20	0.10	1.62	1.62	1.53	1.98	1.85	1.82
Spain	5	1.01	1.29	0.72	0.50	0.44	0.35	2.73	2.45	2.17	2.36	2.13	1.79

Source: Bank for International Settlements, *Annual Report 2007*, and Fitch Ratings.

with bank B at some future time. On the basis of this agreement, automaker A then signs a contract to purchase parts from offshore supplier C. If bank B subsequently fails to uphold its end of the currency swap bargain, offshore supplier C may suffer the consequences of settlement delays or worse, even though it had no direct relationship with bank B. If automaker A is able to stop its payment to the bank in time, then its principal would not be at risk. Nevertheless, this company would have to absorb any losses due to an adverse market move. In this way, counterparty risk adds a new dimension to credit risk. Companies now have exposure to third parties with whom they may never have entered into formal credit relationships. As society becomes increasingly interdependent, counterparty risk expands exponentially.

This is not to say that total financial risk in the economy has increased simply because there are derivative transactions; after all, derivative transactions are a zero-sum game. But derivatives entail additional financial contracting and, therefore, additional exposure to be monitored and managed by the contracting parties. Adequate standards for disclosure regarding creditworthiness have become increasingly important, and investments have had to be made in credit evaluation and monitoring structures. There are also additional risks in the interpretation and enforcement of financial contracts (see Mason 1995, 181). Default by a counterparty with a substantial aggregate exposure could lead to a chain reaction affecting many other institutions.

In fairness to derivatives, it may be argued that these systemic risks are nothing new. For example, the failure of Drysdale Securities in 1982 caused more than $300 million in losses to Chase Manhattan Bank and others in a repo transaction; at that time the Federal Reserve had to act to avert disruptions in the financial markets (see Greider 1987, 487–489). However, derivatives transactions differ from more traditional financial interactions in one key respect: They are off-balance sheet. As a result, their true risks are often not visible to outsiders or, for that matter, even to insiders. It is very difficult, if not impossible, to assess a complex institution's derivative risk exposure solely from the disclosures it has made in its financial statements and the accompanying notes. In the final analysis, while derivatives may pose no incremental risk to the financial system as a whole, they do pose significant risks to participants who have not made adequate investments in people, analytics and technology.

The emergence of asset-backed securities, like that of financial derivatives, forces market participants to focus more sharply on credit risk. Securitization entails systematically grading and segmenting these risks. The typical asset-backed transaction involves a large number of variables, and understanding the correlations among them may require a high level of analytic sophistication. As securitization technology spreads to new jurisdictions

and as more institutions begin to invest in residential and commercial mortgage-backed securities and asset-backed securities, financial professionals need to know more about managing the credit risk of an obligor as it evolves over time. They also need to know more about managing *correlated* credit risk—the risk associated with separate assets that show a collective tendency to change in credit quality in the same direction.

NEW LENDERS

A new set of lenders has become increasingly important in the United States. After 1945, banks held 70 percent of the country's money, insurance companies 20 percent, and everyone else the remaining 10 percent. Since then, as is clear from Table 1.2 and Figure 1.6, banks and insurance companies have lost market share to institutional investors—pension funds in particular—which accounted for 25 percent of assets as of 1995. This shift has accelerated in recent years.

Pension funds, mutual funds and endowments have enormous amounts of money to invest/lend, but their preferences differ appreciably from those of banks. Banks take in short-term deposits and have a natural predilection for making short-term loans. Institutional investors, by contrast, take in long-term money and are inclined to lend for the longer term. To a growing degree, a borrower's timeframe determines whether a bank or an institutional investor will be the better source of debt capital. This bifurcation of the market is another reason why credit risk needs to be better understood.

As the global economy becomes a reality, the distance between debtor and creditor is likely to grow. It is already possible, for example, for receivables from a credit card issued in Indonesia to be purchased by a fund in New York and then sold to a private banking client in Zurich. Evaluating credit risk is a matter of gathering and interpreting information, and as the distance between the borrower and the ultimate lender increases, this becomes more difficult to do.

NEW APPROACHES TO CREDIT RISK

American bankers who survived their industry's crises of the 1980s and 1990s recognized that their approach to credit risk had been deeply flawed. Today, all of the major global financial institutions and many of the second-tier institutions are creatively pursuing effective techniques for managing credit risk. This is a requirement of the banking regulators particularly as a

TABLE 1.2 Relative Shares of Total Financial Assets, 1950–2005

	1950	1960	1970	1980	1990	1995	2000	2005
Monetary authority	9.18%	1.12%	5.43%	1.04%	1.55%	1.23%	2.43%	1.21%
Depository organizations	50.51%	55.03%	58.15%	46.70%	−5.46%	26.55%	31.91%	37.21%
Insurance companies and pension funds	30.10%	27.65%	18.37%	27.94%	38.19%	16.73%	−2.70%	8.90%
Capital markets investors	3.57%	4.47%	11.20%	19.26%	62.92%	43.70%	54.10%	37.06%
Finance and mortgage companies	6.63%	11.73%	6.85%	5.07%	2.81%	11.80%	14.26%	15.62%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Board of Governors of the Federal Reserve System (2006).

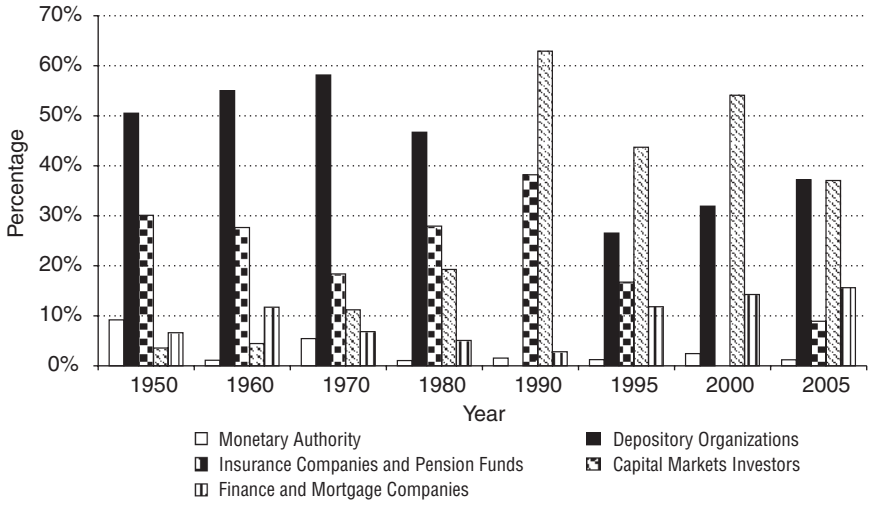

FIGURE 1.6 Relative Shares of Total Financial Assets, 1950–2005.

part of the Basel II Accords. These days all major institutions have developed global credit exposure information systems that are updated continuously so that exposure and pricing may be monitored in real time. Moving away from the traditionally held view that judging credit is fundamentally an "art," many banks are adopting new approaches.

The banking system's general creditworthiness has vastly improved as a result of the following:

1. Consolidation and globalization, which has helped to spread best practices and to diversify their business such that they become less vulnerable to a single country or economic sector.
2. Most major banking institutions have actively developed diverse activities which have reduced their dependency on interest income and led to better balance in their businesses.
3. Enhanced risk management techniques are now widely accepted. This includes statistical portfolio management, securitization, and active hedging using derivatives markets, all of which facilitate better disposal of credit risk in their portfolios. Further, the implementation of Basel II should reinforce the trend of improvement, particularly among those institutions below the top tier.

TECHNOLOGY TO THE RESCUE

Technology has already changed the credit markets. The lender community has changed, the debtor community has changed and the circumstances of lending have also changed radically over the past 10 years. The process of granting credit has also changed although the way commercial loans are made today is not terribly different from the way they were done in the past; however, the consumer finance market has been heavily influenced by new technology. Technology has helped make the market more flexible and is an important part of the reason that the credit markets have all grown so rapidly in recent years. New approaches are particularly evident amongst the new players such as hedge funds and specialty finance companies in the consumer market. Technology has particularly influenced what happens after the original loan has been made. Instead of making loans and holding on to them, most financial institutions now make the loan with the expectation that it will be sold. Hedging is much more commonplace and portfolio management is now a reality at a growing number of financial institutions.

While technology is providing many solutions and new techniques for the management of credit risk, there are challenges that arise from the use of technology. The current turmoil in the subprime mortgage market is an example of what happens when technology goes awry. The subprime markets exist because of the ability to model and manage credit risk using mathematical models. However, when the models do not produce the expected outcome, industry participants are left with substantial losses and some very bad publicity, which is causing many of them to pull back from this marketplace.

And the technical story is a work in progress. In contrast to market risk, credit risk is, by nature, the kind of low probability/high impact risk that is challenging to hedge, or even in some cases to fully understand. Although information is now much more readily available, good information on credit risk is not always available, isn't always reliable and a serious academic study of it in all its aspects has a limited history.

In at least one respect, however, modern society is well equipped to deal with this challenge. Information technology and related analytic tools have evolved at a remarkable pace in the last 20 years. We can gather, analyze, compare, and interpret information more rapidly than any prior generation. Indeed, it is the availability of this technology that has made it possible for lenders to provide credit as widely as they have. It is realistic to expect that additional analytic tools will be developed in the years ahead, and that they will enable us to manage credit risk that is both more complex and more extensive than that of the present.

Some new risk-management approaches have already been applied, and others are still on the drawing board. However, the evolution of new techniques for managing credit risk has been uneven, and significant gaps still remain. The decade ahead should be a period of ferment, innovation, and experimentation, as new approaches are devised, tested and put into use.

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