

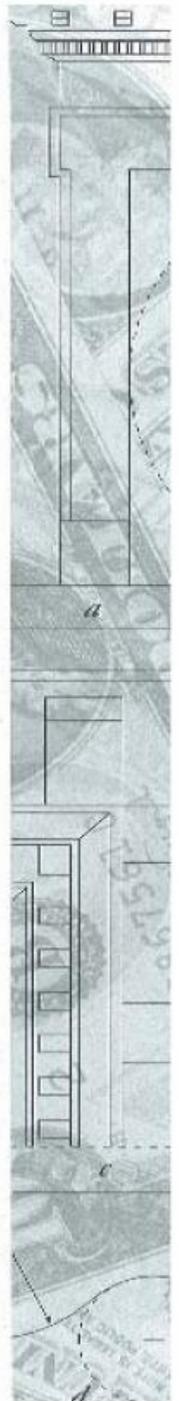
Wharton

**Financial  
Institutions  
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**Bankers Trust and the Birth of Modern Risk Management**

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## Preface and Acknowledgments

I joined Bankers Trust in 1989 after a 15-year career in econometric modeling and forecasting. My interest in banking, or more specifically my interest in credit, arose from the realization that banks needed to do a better job of managing the credit risk of lending products. The U.S. banking industry had performed poorly throughout the 1970s and 1980s. Between 1970 and 1974, the number of U.S. bank failures averaged approximately five per year. By 1982-84, that figure had climbed to approximately 50 per year, and it continued climbing until it reached 280 in 1988. During this period I asked credit officers at a number of leading banks, "If you were convinced that the U.S. economy is headed into a recession within the next 12 to 18 months, what would you do differently to manage credit risk?" The answer I heard most often was "Nothing. We take the risk of our customers. . . . And by the way, we are proud of that." By the end of the 1980s, I was saying to myself, "Yes, but nine out of the 10 largest banks in Texas have failed, and I'm sure every one of those banks wishes they had a second chance."

Bankers Trust was the only bank I talked with that seemed to understand the relatively high risks in commercial lending. During my interviews, I learned about the firm's risk-adjusted return on capital (RAROC) model, and I was told how this analytical framework was used to evaluate transactions and reallocate capital from low-return to high-return businesses. In spite of its views on lending, Bankers Trust was still interested in exploring the questions that interested me: "How should we think about managing the credit risk of a loan portfolio over the credit cycle? And what are the correct models for measuring and managing credit risk in the context of market volatility?"

Today, I can look back and say that I have spent most of my banking career implementing, refining, and extending ideas that were first developed at Bankers Trust in the 1970s and 1980s. In fact, this statement is true for most people who work in the field of risk management, and it is also true for most managers in global banks. Bankers Trust recognized that the old paradigm of the commercial bank as the intermediary that collects deposits, provides loans, and holds loans on its balance sheet was a declining business. More than any other single institution, Bankers Trust defined a new business model for modern banking.

This paper argues that Bankers Trust's pioneering work in risk management and its objective, analytical approach to the market were common themes and guiding principles throughout its transformation from a struggling full-service bank into a dynamic, well-capitalized wholesale financial institution. As a consequence of this transformation, Bankers Trust became more profitable than any of its rivals.

Under legislative acts passed in the 1930s, the U.S. banking industry in the immediate post-World War II period was a highly regulated industry. The laws that governed banking were heavily biased toward ensuring the stability of the system rather than promoting competition and innovation. But starting in the late 1960s, the world began to change both around and within the cozy, protected banking industry. Deregulation, global competition, new product development,

and technological change introduced greater risk into the business of banking. In order to survive in this new world, banks would have to learn how to manage risk. Bankers Trust was the first firm to realize that risk management was both a necessity for survival and a strategic tool to guide the evolution of the firm.

The analytical practices of risk management grew out of the Resources Management department of Bankers Trust in the early 1970s. At that time, Resources Management was responsible for trading foreign exchange, government bonds, municipal bonds, and other short-term financial instruments; funding the bank; and managing the bank's investment account. The need to identify and account for risk was initially recognized by Charles Sanford, who was then the head of Resources Management. In the years that followed, Sanford rose to become the chairman and CEO of Bankers Trust, and under his guidance, the principles of analytical and strategic risk management were applied to all departments and all operations of the firm.

Just as a good model does not ensure a good result or a good forecast, a good idea alone did not ensure the successful transformation of Bankers Trust. That transformation was the result of a team effort—a team that extended throughout the firm. According to Ralph MacDonald who was head of the Corporate Finance department at Bankers Trust during the latter part of the 1980s, "Charlie was able to succeed because there was a cadre of senior managers and employees at the bank who were willing to work with him and who fundamentally recognized that he was on the right path."

A theme that was expressed repeatedly in interviews with former employees of Bankers Trust, especially those individuals who had been part of the transformation from the early 1970s, was the sheer difficulty of driving change in the institution. The emphasis was on changing the firm—not dismissing employees and hiring new staff. As former bond trader and Loan Portfolio head Allen Levinson explained, "Many employees wanted to be part of the new strategy, but they did not know how to do it. It was especially difficult because employees could look across the street and see behavior that was highly valued in peer institutions but actively discouraged and unrewarded at Bankers Trust." While this paper does not attempt to describe the difficulties of implementing change in a large institution, the stresses created by the radical changes that took place in Bankers Trust took many forms but were ever present. By the early 1990s, Bankers Trust had grown to pride itself on having a culture that "welcomes—in fact, thrives on—change." It recognized that one of the guiding principles of its strategy was "to be agents of change, not guardians of the status quo."

Although the transformation of Bankers Trust was a team effort, this paper does not attempt to describe all of these developments or identify all the individuals who contributed to these developments. I would, however, like to thank the individuals whom I interviewed in the course of my research and the individuals who provided comments on earlier drafts of this paper: Edward I. Altman, Dan Borge, Kevin Burke, Robert S. Chirinko, Jack D. Cowles, Yves de Balmann, John Drzik, Peter Freund, Patrick Gillen, Jeffrey Glibert, Abraham Gulkowitz, Karen Gurvis, Duncan Hennes, Loretta Hennessey, Richard J. Herring, Douglas G. Hoffman, Salvatore Iannuzzi, Lawrence R. Klein, Christopher P. Kobrak, Carol Leisenring, Andrew Leonard, Allen Levinson, Clinton D. Lively, David T. Llewellyn, Ralph L. MacDonald, Jr., Joseph A. Manganello, Jr., Christopher Meyer, Judith Modica, Daniel Mudge, Russell Playford, Brian J.

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This paper is intended to provide an accurate account of the development of risk management practices at Bankers Trust and their strategic application during the firm's transformation that took place from the early 1970s to the mid-1990s. While I am grateful to the many individuals who provided information for this paper, I accept sole responsibility for any errors and omissions. Finally, the views and interpretations presented in this paper are mine and are not intended to reflect the opinions of Deutsche Bank AG or the Wharton Financial Institutions Center.

Gene D. Guill  
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## Bankers Trust and the Birth of Modern Risk Management

*The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk. . . .*

Peter L. Bernstein  
*Against the Gods: The Remarkable Story of Risk*<sup>1</sup>

### I. Introduction

This study provides an introduction to the development of modern risk management practices. The pioneer in this field was Bankers Trust Company in the period from the mid-1970s to the mid-1990s. At the beginning of this period, Bankers Trust was the sixth-largest U.S. commercial bank in terms of deposits. By the early 1990s, its ranking had slipped to eighth,<sup>2</sup> but during the intervening years it had successfully “transformed itself from a second rate, ill-focused, near insolvent commercial bank into a dynamic, well-capitalized, highly profitable merchant bank.”<sup>3</sup> The strategy that guided Bankers Trust’s transformation focused on the management of risk, the productive deployment of capital, the development of new products, and the development of new markets. Noticeably absent from this strategy was the acquisition of competitors or the aggressive accumulation of assets.

Using the record of Bankers Trust, this study argues that successful firms are in the business of managing risk just as much as they are in the business of managing returns. In general, firms that manage risk well have a competitive advantage—whatever their field. If a firm understands risk, it can

- make conscious decisions to embrace or shed risks;
- charge a rational price for the risk it assumes;
- redeploy capital away from under-performing activities to those that earn risk-adjusted returns in excess of a prescribed target; and
- accurately judge how much total capital it needs to hold as a buffer against unexpected losses.

Rivals who continue the age-old practice of doing business based on “gut feel” or “what was done in the past” may win business in the short term because they are not charging the full premium for risk. But they will lose out over time as unexpected losses take their revenge and customers migrate to more stable institutions.

This study also points out that risk management is much more than mathematics and data. In fact, risk management is a core element of virtually every aspect of managing a firm. It is often the case that mathematics and data are the easy part of risk management. The hard part is creating a culture and discipline of risk management, incorporating risk management into budgetary and strategic activities, integrating risk management into personnel management (including incentive compensation), and sustaining the standards of risk management through

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<sup>1</sup> Peter Bernstein, *Against the Gods: The Remarkable Story of Risk* (New York: John Wiley & Sons, Inc., 1996).

<sup>2</sup> Bankers Trust’s rankings by deposits relative to other U.S. commercial banks are from *American Banker*, August 14, 1974 and September 9, 1993. In 1995, Bankers Trust ranked seventh among U.S. commercial banks in total assets. See *American Banker*, November 16, 1995.

<sup>3</sup> Peter Lee, “BT Looks to Sanford’s Sorcery,” *Euromoney*, January 1991, p. 24.

the extreme periods of earnings cycles. Success in these areas requires the unwavering support of top management.

Throughout this study, the term “risk” is used to refer to situations in which the probabilities of different outcomes are either known or can be inferred with reasonable accuracy. Risk is different from “uncertainty,” which refers to situations in which the probabilities of alternative outcomes are not known or cannot be accurately discerned.<sup>4</sup> While both risk and uncertainty refer to situations where outcomes cannot be accurately predicted, an uncertain situation represents a far greater state of ignorance than does a risky situation.

It has been argued that the progress of civilization has been achieved through the conversion of uncertainty into risk and the subsequent conversion of risk into certainty. But the second part of the progression does not occur very often. Most of the information we have today is incomplete or inaccurate.<sup>5</sup> Furthermore, risk management is about the future, and the information we have about the future is inherently incomplete. This paper points out that in a world in which certainty seldom prevails, risk—properly understood and properly managed—can be a powerful tool.

## **II. Commercial banking in the 1950s and early 1960s**

Starting in the early 1960s, a series of wide-ranging events introduced a degree of volatility and turbulence into U.S. financial markets that had not been witnessed since the Great Depression. These conditions clashed with the organizational structure and culture of the financial services industry as well as the regulatory practices of that time. Large money-center banks were hit particularly hard. To gain some perspective on these developments, it is helpful to revisit the environment in which the commercial banking industry operated in the 1950s and early 1960s.

The economic environment of the 1950s and early 1960s was one of relatively stable growth, low inflation, fixed foreign exchange rates, and low interest rates. The U.S. economy was largely self-sufficient in terms of natural resources, manufactured goods, and services. Furthermore, the recovering economies of war-torn Europe and Asia provided stable and growing demand for U.S. exports.

The structure and regulatory policies of the financial services industry of that time had been put in place by New Deal legislation in the 1930s. These policies created a protected environment in which the financial services industry was segmented into secure, insulated sectors. Commercial banks controlled much of the loan and credit business. Savings and loan institutions offered savings products (on which checks could not be written) and channeled those funds into mortgage lending. Investment banks were given a virtual monopoly on the underwriting and placement of securities. Insurance companies offered products to manage risk with little competition from other players in the financial services industry. These regulations limited competition. Furthermore, an implicit social contract existed that perpetuated this situation.<sup>6</sup> The underpinning of this social contract was legislation passed during the Great Depression that was biased toward control and protection rather than open markets and free competition.

The Glass-Steagall Act of 1933 was one of the primary legislative acts of the Depression era. It delineated the businesses commercial banks could and could not enter. Commercial banks were positioned as the primary intermediaries between savers and borrowers, but they were

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<sup>4</sup> See Frank H. Knight, *Risk, Uncertainty, and Profit* (Chicago: University of Chicago Press, 1921).

<sup>5</sup> Bernstein, *op cit.*, pp. 206-7.

<sup>6</sup> David Rogers, *The Future of American Banking* (New York: McGraw-Hill, Inc., 1993), p. 6.

barred from the securities business. Commercial banking was a relatively simple business in which banks made money on the spread between the interest rates paid for deposits and the interest rates charged on loans. Products were standardized, and innovation was infrequent. In this era of protection and stability, commercial banks functioned much like public utilities and developed a culture that emphasized set procedures, long-term relationships with clients, avoidance of change, and lifetime employment for employees.

Starting in the early 1960s, the world began to change both around and within the cozy, protected commercial banking industry. The first big change was in macroeconomic trends—more specifically, rising inflation, slowing economic growth, and rising and more volatile interest rates. Rising interest rates undermined bank deposits as individuals transferred their savings out of bank accounts and into higher-paying money-market mutual funds and other securities. Eventually, the Monetary Control Act of 1980 eliminated the interest rate ceilings on deposits, but it did not expand the products that banks were allowed to offer. Thus the liability side of the balance sheet was partially deregulated, while the asset side remained tightly regulated. This situation was further exacerbated by the disintermediation of commercial banks brought about by the growth in the commercial paper market and the decline in demand for loans from investment-grade customers.<sup>7</sup> It would take almost 20 more years before changes to the Glass-Steagall Act finally leveled the regulatory playing field.

Another change that rocked the money-center banks was globalization. Although globalization allowed U.S. banks to follow their customers abroad and offer financial services in overseas branches, it also allowed foreign banks to enter the U.S. market. Many foreign banks were able to offer investment banking and asset management products that were off-limits to the tightly regulated U.S. commercial banks. In addition, lower capital standards in some regulatory jurisdictions enabled foreign banks to undercut their U.S. competitors.

An event closely related to the growth in globalization was the end of the era of fixed exchange rates. In the first years following the abandonment of the Bretton Woods Agreement in 1971, exchange rates among the world's major currencies generally floated within an "acceptable" band. But this experience was short-lived as the twin OPEC price shocks of 1973-74 and 1979 and rising inflationary pressures of the 1970s caused interest rates and exchange rates to become more volatile.

The increasing volatility of financial markets soon became evident in the overall performance of the commercial banking industry. Starting in the 1970s, banks seemed to stumble from one boom-bust lending cycle to another. The first of these experiences occurred in the commercial real estate market. This bubble burst in the 1973-75 recession. The money-center banks next turned to less developed countries (LDCs) as target markets for their lending activities. This boom market lasted until the prolonged recession of 1981-82 when some 27 countries defaulted or rescheduled their debts. In the aftermath of the LDC crisis, lending activity focused on energy and other commodities. But commodity prices plummeted in 1986, and the commercial banking industry was again battered by loan losses.

Increased volatility in the macroeconomic environment together with the trends in globalization and deregulation increased the importance of understanding and managing financial risk. At the same time, advances in financial theory, such as the capital asset pricing model and options pricing theory, enabled analysts to isolate specific categories of risk, study their behavior, and develop scientifically based risk management practices. Finally, advances in information

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<sup>7</sup> See Ron Chernow, *The Death of the Banker* (New York: Vintage Press, 1997).

technology—the declining cost of computer processing, the introduction of personal computers, and the proliferation of commercially available software—made quantitative solutions widely available and opened the doors to new research in financial markets. The stage was set for the development and application of new techniques for managing financial risk.

### III. New ideas for new challenges

Like most innovations that drive the economic system forward, modern risk management practices were born out of competitive pressures for survival and economic opportunity. But innovations require entrepreneurs, and the key entrepreneur in this story is Charles Sanford. Sanford joined Bankers Trust in 1961 after completing an MBA at the Wharton School and a brief sojourn in academics. He started his banking career as a commercial lending officer, but moved to the bank's Resources Management department in 1969 and subsequently became department head in 1973. When Sanford assumed the leadership of Resources Management, the department was responsible for trading foreign exchange, government bonds, municipal bonds, and other short-term financial instruments; funding the bank; and managing the bank's investment account.<sup>8</sup>

Several months into his new position, Sanford ran into a government bond trader as he was leaving for the day. As they walked out of the building, Sanford asked, "How did you do today?" The trader responded, "I brought 'em in and shot 'em out. Didn't make any money."

The shallowness of that statement stuck in Sanford's mind. Did this trader have a good day or a bad day? Did he pay/receive a good price or a bad price for the bonds that he bought/sold? How should his performance be evaluated? Should his performance be evaluated relative to the market or against an absolute benchmark? More generally, what is the correct way to think about the performance of the trader, the department, and the bank as a whole?

In considering these questions, Sanford hit upon three principles well established in modern finance but never integrated and applied to managing a firm:

1. By taking a position—that is, by buying bonds—the trader brought risk into the bank and used the bank's capital.
2. The only reason to take risk is to earn a return; therefore, in taking a position, the trader had the expectation of earning a return. Furthermore, the higher the risk, the higher the return the trader should expect.
3. To justify the use of shareholders' capital, the trader's expectation for a return must be consistent with the minimum return for similar risks required by shareholders.

Working with these principles, Sanford set out to relate individual transactions to the use of the bank's capital and, accordingly, to the interests of the bank's shareholders. As he later wrote in a memorandum addressed to the head of Bank Supervision at the Federal Reserve Bank of New York:

*Resources Management department has been working on ways of allocating capital to businesses with different risk characteristics. . . . We agree that one bank's book equity to assets ratio has little relevance for another bank with a different mix of businesses. Certain activities are inherently riskier than others and more risk capital is required to sustain them. The truly scarce resource is equity, not assets, which is*

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<sup>8</sup> As regulatory restrictions were relaxed, the mandate of Resources Management was later expanded to include trading of corporate bonds, derivatives, and equities.

*why we prefer to compare and measure businesses on the basis of return on equity rather than return on assets. What is needed is a way of allocating capital along our product lines that is consistent with the risks of each activity.<sup>9</sup>*

The key to Sanford's model was the explicit introduction of risk. He recognized that capital is held as a buffer to protect a firm against large, unexpected losses, and he developed a methodology for allocating capital to individual transactions in a manner to reflect risk—in this case, the potential loss of individual positions. Capital allocated in this manner was called risk capital or economic capital. By comparing the return generated by a transaction to the amount of risk capital that it required, he was able to calculate the risk-adjusted return on capital for that transaction. Finally, he reasoned that maximizing risk-adjusted return on capital would be an operational proxy for maximizing the return on shareholders' investments. He named this analysis "risk-adjusted return on capital," or RAROC.

Risk capital, or economic capital, has become the key concept at the heart of modern risk management. It is not calculated from traditional accounting measures such as book capital or equity capital. Instead, it is derived from our understanding of risk. And since our understanding of risk is always incomplete and usually inaccurate, the calculation of risk capital cannot be reduced to a simple formula with static input parameters. The calculation of risk capital is a quest—it presents the challenge of understanding the risks to a business, a transaction, or a position. Our ability to estimate risk capital improves only as our understanding of risk improves.

By introducing risk explicitly into business decision-making, Sanford was able to align the interests of the people who manage the firm's capital (the employees who transact on behalf of the firm) with the interests of the people who own the capital (the shareholders). This alignment creates an incentive structure in which all stakeholders seek to move in the same direction to maximize the risk-adjusted return on capital. These conditions present a compelling opportunity to unleash Adam Smith's "invisible hand," stand back, and let it go to work. But realizing this opportunity means building the analytical models and creating the corporate environment in which individuals are given the opportunity to assume and manage risk. These individuals include the bankers, the traders, the managers, the CEO, and the board of directors.

#### ***Existing capital versus required capital***

The word "capital"—which is used in many fields including accounting, economics, finance, and regulatory practices—is often defined to mean different things. The fact that capital can take on different meanings is frequently a source of confusion.

In presenting the concept of economic capital, a distinction is often made between *existing* capital and *required* capital. Book capital, market capital, and regulatory capital are examples of capital that *exists*. It is the job of the accountant or controller to measure these concepts based on a combination of rules and principles. Economic capital, on the other hand, is an example of *required* capital. It is the capital required to protect against the risk of large unexpected losses. In this case, it is the job of the controller or analyst to estimate economic capital from actual risk positions and their potential changes in value.

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<sup>9</sup> Memorandum dated February 2, 1979.

#### **IV. Evolution of the RAROC model and risk management practices**

The RAROC model was first applied in the Resources Management department of Bankers Trust in the mid-1970s. In early applications of this model, risk was defined as the maximum potential loss that could occur during a “reasonable” time required to exit positions of “normal” size. Empirical estimates of potential loss were gleaned from post-World War II market experience. The maximum potential loss defined the amount of capital the bank should hold against a position, and the pre-tax, risk-adjusted return on capital (RAROC) was calculated as the income (gain/loss) earned on the position divided by the risk capital. This calculation was then converted into an after-tax number and annualized so it could be compared to a one-year target return on capital.

The definition of risk as the potential loss that might occur within a defined period firmly anchored RAROC in the world of mark-to-market (fair value) accounting. Any attempt to estimate economic capital requires economic valuations. Accountants and economists agree that prices observed in active, competitive markets are the best evidence of economic value.

In the years that followed, the RAROC model was developed into both a conceptual theory of risk measurement and an empirical model for guiding day-to-day and strategic decision-making in the bank, including incentive programs for employees. These applications required that the model be expanded to cover other products and refined to incorporate application-specific information.

##### *Transfer pricing for funding loans*

The first extension of RAROC was in the introduction of a matched-cost-of-funds transfer pricing system to separate funding risk (interest rate risk) from lending risk (credit risk).<sup>10</sup> In the early 1980s, the cost of funding the bank’s loan portfolio was considered on a pooled basis, and an average cost of funds was used to calculate the profitability of individual lending facilities. This practice caused problems when interest rates spiked up. Long-term fixed-rate loans were funded with short-term instruments, and the mismatch cost the bank millions of dollars. The losses created by this mismatch spurred Bankers Trust to devise a cost-of-funds mechanism that matched the interest rate repricing of the funding to that of the loan, locking in a fixed spread for the lenders. The lenders managed the credit risk and received the credit income or loss. Meanwhile, the traders, who were responsible for funding, received any gain/loss they generated on taking maturity mismatches in interest rate positions. This matched-cost-of-funds transfer pricing system enabled Bankers Trust to decouple market risk income from credit risk income. As a result, the firm could measure the RAROC of its funding desk (Resources Management) and insulate lenders from interest rate fluctuations.<sup>11</sup>

Separating interest rate repricing of the funding from the maturity of a loan is standard practice today, but Bankers Trust is thought to have been the first to devise and implement such a system.

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<sup>10</sup> A necessary innovation that preceded the matched-cost-of-funds transfer pricing system was the establishment of the funding desk as a profit center. This innovation occurred in 1973-74. It set the stage for later refinements and put the funding desk at the center of the bank’s interest rate activities and liquidity management. Bankers Trust was one of the first banks to adopt this structure.

<sup>11</sup> This experience pointed out the need to attribute sources of income to the specific risks incurred. Sanford later developed this idea in a 1993 paper “Financial Markets in 2020,” delivered as the keynote address at the Federal Reserve Bank of Kansas City’s annual Economic Symposium. A *Time* cover story called this paper “a Magna Carta for this new world of electronic finance.”

### **Early RAROC: Initial methodology**

The earliest applications of risk-adjusted return on capital (RAROC) focused on market risk and liquidity risk, the most significant risks to the trading activities of Resources Management in the mid-1970s. To get a sense of the calculations, consider a \$100 million position in 30-year U.S. government bonds. Assume this position was bought at \$97.000 million on day one and sold at an average price of \$97.025 million five days later. The calculation of RAROC for this transaction requires that we know or estimate 1) the risk capital that the bank should allocate to this position and 2) the income (gain/loss) earned on the position.

#### *Estimation of risk capital*

Risk capital is a measure of potential loss in a position in a reasonable downside scenario. In the trading activities of Resources Management, potential losses were viewed as a function of two variables:

1. Liquidity period – the maximum time required to exit a position; and
2. Price risk – the maximum decline in price that might occur during the specified liquidity period.

In the earliest applications of RAROC, a reasonable downside scenario was defined as the maximum loss for a position over the specified liquidity period observed in post-World War II history.

In this example, Bankers Trust might have assumed that it would take a maximum of three days for a trader to exit a position of \$100 million in 30-year government bonds. Historical information might reveal that the maximum three-day decline in the price of 30-year government bonds was 5%. The estimates for both the liquidity period and the price risk were subject to review and possibly adjusted to reflect current market conditions. Risk capital was then calculated as:

$$\begin{aligned}\text{Risk capital} &= \$100,000,000 * 0.05 \\ &= \$ 5,000,000\end{aligned}$$

#### *Income earned on the position*

Income (gain/loss) earned on the position was taken directly from the profit and loss recorded for the transaction. In this case, assume the trader recorded a gain of \$23,200.

#### *Calculation of risk-adjusted return on capital (RAROC)*

The pretax risk-adjusted return on capital for the five-day holding period is calculated as the ratio of gain/loss earned on the position and the risk capital used by the position:

$$\text{RAROC} = \$ 23,200 / 5,000,000 = 0.46\%$$

In evaluating performance, the RAROC number was converted to an after-tax measure and annualized so it could be compared to the one-year target return on capital of 20%. Assuming an effective tax rate of 34%, this transaction produces a post-tax, annualized RAROC of:

$$\text{RAROC} = 25.01\%$$

### *Credit risk in lending products*

RAROC was next extended to credit risk in lending products. Although corporate lending was not under his management, Sanford recognized that credit risk was roughly 50-70% of the total risk taken by a commercial bank and any attempt to recognize and manage risk in Bankers Trust would have to include the credit risk of lending products.

The application of RAROC to credit risk was not straightforward. First, it was not clear how to measure credit risk. Market risk had been defined as changes in market value, but loans were reported at historical cost with credit loss provisioning. Loans could experience increasing risk—that is, deteriorating quality—for extended periods before they might be viewed as impaired and any losses in value recognized in the income statement. Second, lending officers, their managers, and most members of the management committee were bitterly opposed to the concept of reducing credit analysis to a single empirical measure. They argued that credit risk was both an art and a science and that any attempt to reduce the art in credit analysis would result in meaningless numbers.

Sanford's early work in extending RAROC to lending products followed the same methodology that he had used to measure the risk-adjusted performance of trading products. Arguing that corporate bonds, commercial paper, and loans are all IOUs, he set out to measure the price volatility of bonds and commercial paper issued by individual borrowers and then estimated how long it would take to sell the loan. The empirical results were insightful, but this methodology could not be generalized across the spectrum of lending products and corporate borrowers. First, revolving credit lines and letters of credit are relationship products that could not (and still cannot) be sold without undermining the relationship with the customer. Second, many borrowers did not issue corporate bonds. Third, lending officers argued that this approach did not reflect the realities of the lending market, and they were unwilling to take on the additional tasks necessary to implement this methodology.

In 1978, Sanford hired Dan Borge to work with him in developing analytical models and solutions for the challenges facing Resources Management. The development and rollout of RAROC turned out to be one of the biggest of these challenges. When Borge turned his attention to credit risk, he recognized that the methodology needed to incorporate credit risk into RAROC would have to include the expertise of credit officers, but that it should require from them only the information that was needed to distill their analyses and insights into an estimate of risk capital for individual loans.

Borge came up with the idea of asking the credit officers to do one thing: to assign an internal rating to all borrowers/obligors. He reasoned it would be difficult for credit officers to object to this request since ratings agencies were already assigning credit ratings to corporate bonds. As it turned out, the credit officers developed a disciplined ratings system that became a permanent feature of Bankers Trust's credit procedures. It has subsequently become an integral component of the ratings-based approaches to credit risk in Basel II.<sup>12</sup>

Returning to Sanford's reasoning that corporate loans are similar to corporate bonds, Borge decided to use the observable changes in corporate bond spreads to estimate the volatility in value of corporate loans with the same rating. Thus, the application of RAROC to credit risk worked as follows:

1. Credit officers assigned ratings to each borrower/obligor.
2. Risk amount was calculated as the current outstandings under the facility plus a percentage of the unused facility limit.
3. Risk factors for each ratings bucket were calculated from the volatility of corporate bond credit spreads of the same rating.
4. Risk capital was assigned on the basis of risk amount, credit duration of the exposure, and the risk factor.

This methodology may seem logical, even commonplace, today, but it was revolutionary and controversial at the time. Within the banking industry, including at Bankers Trust, the idea of comparing loans to bonds was innovative, possibly even heretical. Most significantly and most contentiously, however, it provided insights into just how risky lending products are compared to trading and money-market activities.

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<sup>12</sup> A number of banks had ratings systems for borrowers prior to Borge's application of RAROC to the lending business at Bankers Trust. In hindsight, these ratings systems were stand-alone ranking systems that provided a qualitative assessment of relative credit quality. Borge's contribution was in integrating the ratings system into an empirical measure of risk that enabled assessments of economic risk and eventually led to the analysis of pricing adequacy and return/risk performance.

**Early RAROC: Credit risk methodology**

According to the methodology developed by Dan Borge, economic capital for commercial loans and commitments was calculated as:

$$\text{Economic capital} = \text{Risk amount (\$)} * \text{credit duration} * \text{risk factor (\%)}$$

where

- Risk amount = Notional committed limit for a loan or amount expected to be outstanding over the remaining life of a revolving credit facility, in U.S. dollars
- Credit duration = Time in years until the risk amount is repriced to the market credit spread corresponding to the credit quality of the borrower
- Risk factors = Maximum percentage change in credit spreads over the course of a year, at a 99% confidence interval, in percent

For a commitment, or revolving credit facility, the risk amount was calculated as:

$$\text{Risk amount} = \text{current outstandings} + \text{LEF} * (\text{committed limit} - \text{current outstandings})$$

where

- LEF = Loan equivalent factor (LEF) is the percentage of the unused (unfunded) committed limit that is expected to be drawn during the remaining life of the facility.

Risk factors were calculated for eight different groups of ratings. These groups were defined to be roughly comparable to categories of publicly rated corporate bonds—for example, Group 1 was comparable to the highest-quality bonds, Moody’s “Aaa,” while Group 8 was comparable to the lowest-quality bonds not in default, Moody’s “C.” Empirical values of the risk factors were calculated from the historical volatility in returns of corporate bonds grouped into each of these ratings categories.

The calculation of credit risk capital for a new loan or commitment required only that the credit officer assign a rating to the borrower (say, a “1”, “2”, or “4”) and enter an assumption for expected utilization. Information on credit duration and risk amount were determined from the loan documentation.

**Example:** Calculation of credit risk economic capital for hypothetical \$50mn commitment:

Loan information

Notional committed amt	\$50mn
Amt to be drawn at closing	\$25mn
Expected utilization on unused committed amt	60%
Credit rating of borrower	3
Maturity	5 yrs
Credit duration	3.5 yrs
Commitment fee	5 bps
Net interest margin	L + 1.50%

**Risk Factors (look-up table):**

RAROC Rating	Moody's Equiv. Rating	
0	riskless, unrated	
1	Aaa, Aa1	0.65%
2	Aa2, A23, A1	0.75%
3	A2, A3, Baa1	1.04%
4	Baa2, Baa3, Ba1	1.47%
5	Ba2, Ba3, B1	2.66%
6	B2, B3	4.01%
7	Caa, Ca	12.45%
8	C	15.82%

$$\begin{aligned} \text{Risk amount} &= (\$25 \text{ mn} + (.60 * (\$50 \text{ mn} - 25\text{mn}))) \\ &= \$40\text{mn} \end{aligned}$$

$$\begin{aligned} \text{Credit risk econ capital} &= (\$40 * 3.5 * 0.0104) \\ &= \$1.46\text{mn} \end{aligned}$$

This approach sidestepped the thorny analytical issue of fair-valuing loans. From today’s vantage point, almost 30 years later, it can be said that Bankers Trust’s approach translated the credit risk of loans into spread risk (i.e., market risk and default risk) and calculated economic capital based on the maximum mark-to-market exposure of loans/commitments over the credit duration period. Today’s methodologies for calculating credit risk economic capital identify spread risk as well as the loss that is expected to occur on the specific position in the event of default.

### *Standard-deviation-based measures of risk*

Another refinement to the RAROC model involved generalizing the definition of risk. While the earliest applications of RAROC measured risk as the maximum loss for a position observed in post-World War II history, in the late 1970s that definition was replaced with a probability or standard-deviation-based measure. This definition of risk could be applied to any asset or position and was less dependent on historical experience.

As an example of this idea, consider a position with a known market value. The position's future value is not known, but it can be represented as a random variable with a defined probability distribution describing the likelihood of future values. Through the use of these concepts, risk was defined as the maximum loss that might be expected to occur over a defined period into the future—three days, one month, one year, etc.—and at a specified confidence interval—for example, 99% probability.

Bankers Trust adopted the standard deviation of market value as a measure of risk in 1977-78. By the early 1990s, this application of probability theory to risk measurement was commonly referred to as value-at-risk (VaR). Today, it is a standard tool in the risk management toolbox. While the theoretical underpinnings of VaR were well known in probability theory, Bankers Trust's use of these concepts in a practical model for managing business risk is thought to be a first.

### *Correlation*

The acceptance of probability-based measures of risk enabled RAROC to incorporate the principles of modern portfolio theory that were first developed in the early 1950s. Harry Markowitz (1952) and, shortly thereafter, Andrew D. Roy (1952) independently published a methodology for selecting a portfolio of assets that, according to specified definitions, optimized return for a given level of risk. Each proposed a risk measure that recognized the correlation among expected returns of individual positions in a portfolio and made it possible to measure the benefits of diversification for the portfolio's expected return. Although both researchers steered clear of specifying how return distributions for individual positions might be specified, their work established the importance of diversification in managing risk and the role of correlation in measuring risk.

### *Identifying and capturing all the risks*

The next big enhancement to RAROC came in the form of "putting it all together." In applying RAROC throughout the bank, it was necessary to analyze each product individually and to identify the major sources of price volatility. Over time, Bankers Trust identified seven categories of risk, but these were generally grouped into four super-categories:

- Market risk: Loss in the value of a position caused by changes in market variables—for example, interest rates, foreign exchange rates, equity prices, commodity prices, etc.
- Credit risk: Loss in the value of a loan or other credit instrument due to a deterioration in the credit quality of the borrower or counterparty.
- Operational risk: Loss in value due to operating or systems errors within the firm.
- Liquidity risk: Loss in value incurred during an unanticipated/undesired extension of the holding period due to market disruptions or a drop-off in market activity.

For each type of risk, historical price volatility was calculated to determine the maximum potential loss within a one-year period at a 99% confidence level. While the exact methodology for measuring potential loss differed for each type of risk, the calculation of risk capital was essentially the same once the risk had been measured.

### **Liquidity risk**

Market liquidity is a significant issue in trading activities. Since RAROC was first applied in Resources Management, it is not surprising that Bankers Trust sought to include liquidity risk in the early determination of economic capital.

Liquidity risk is financial risk due to uncertain liquidity—that is, the loss in value incurred during an unanticipated or undesired extension of the holding period due to market disruptions or a drop-off in market liquidity. Generally speaking, liquidity is a function of price, but price discovery is not always a continuous process in the market. Liquidity risk arises from situations in which a party interested in trading a position cannot find anyone in the market who wants to trade. There can be extended periods when price quotes are not available while market participants wait for volatility to subside or new information to become available.

In the Bankers Trust RAROC system, liquidity risk was treated as an unanticipated extension of the holding period for positions of “normal” size. Using largely subjective information, liquidity risk entered the economic capital calculation as an input in the determination of market risk. Over time, Bankers Trust spent considerable time trying to extract estimates of liquidity risk from market data, but reliable, defensible estimates for this parameter remained elusive.

Market risk, credit risk, and operational risk are now subject to regulatory capital charges under the Basel II Accord. Liquidity risk is implicitly embedded in the parameter estimates used to calculate market risk. Liquidity risk is likely to remain an input in the calculation of market risk until techniques are developed for estimating liquidity risk and its relationship to market risk and credit risk directly from market data.

### *Capital adequacy*

Sanford and his colleagues shared their research and risk management practices with U.S. and foreign regulators from the time RAROC was first put into practice. In general, the regulators were receptive and saw “risk capital” as a promising approach for developing formal regulatory standards. The challenge in defining capital adequacy for purposes of regulatory reporting and supervision was (and remains) to devise procedures for computing capital adequacy that are comprehensive, simple to implement, and accurate in assessing an institution’s required capital.

Bankers Trust perceived the same challenge in its internal risk management practices. In a 1986 paper, Kenneth Garbade, who worked in Bankers Trust’s Cross Markets Research Group, wrote:

*In view of the importance of risk assessment and capital adequacy to regulatory agencies and market participants, it is not surprising that many analysts have tried to devise procedures for computing risk and/or capital adequacy which are (a) comprehensive and (b) simple to implement. Without exception, however, those who make the effort quickly discover that the twin goals of breadth and simplicity are seemingly impossible to attain simultaneously. As a result, risk and capital adequacy formulas are either complex or of limited applicability, and are sometimes both.<sup>13</sup>*

In practice, firms have a much greater tolerance for complexity and subjectivity in internal risk measurement, reporting, and decision-making than in external reporting. Business decisions don’t wait for models to be fully tested and parameters to be verified through historical experience. Furthermore, it is usually the case that model development and refinement continue after the model is first applied, whereas any restatement of information released to

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<sup>13</sup> Kenneth D. Garbade, “Assessing Risk and Capital Adequacy for Treasury Securities, *Topics in Money and Securities Markets*, 22, New York: Bankers Trust.

analysts, shareholders, or regulators must be explained and justified—frequently under a cloud of suspicion.

A good model can provide valuable insights even if its specification is crude and simplistic. These insights can be especially rewarding for the firm that is the innovator and the first to use these insights in the market. While Sanford recognized the need to refine, update, and monitor the measurement of risk, he also recognized the opportunity to use risk assessments, albeit imperfect, to manage existing businesses and develop new activities. In his opinion, the CEO is the ultimate risk manager of the firm. In this role, the CEO can accept risk assessments that are based on informed opinion but not yet fully vetted and validated with rigorous analysis because the CEO can control how these assessments are used.

In normal circumstances, regulators do not enjoy the same control, familiarity with specific issues, and experience with individual employees as a CEO. In addition, the regulatory system requires procedures for assessing risk and calculating capital adequacy that can be applied uniformly by all banks and all regulators.

In 1985, Sanford wrote a lengthy memo to Paul Volcker, then chairman of the Board of Governors of the Federal Reserve System, in which he 1) argued the need for risk-based rules for determining regulatory capital, 2) described Bankers Trust's RAROC model, and 3) encouraged the regulatory community to consider this "risk capital attribution system . . . as a starting point for an industry-wide approach."

Concluding the memo, he wrote:

*We believe that the main elements of the capital attribution system described above are generally applicable to the other banks and the regulators. This is because the system is built on potential changes in value and on the actual risk positions that produce changes in value. . . .*

*We recognize that other banks and their regulators would have to tailor their application of this risk capital method to their own organizational structures, their own information systems, and their own operating styles. The regulators would have the additional problem of applying a single system to many different banks. Therefore, we do not propose that anyone literally transplant our system to their organization.*

*Nevertheless, there is likely to be broad agreement on the notion that required capital increases with risk; on the basic types of risk (credit rate, FX, . . .); and on the positions which give rise to these risks (profiles of borrower credit ratings, repricing mismatches, currency mismatches, . . .). Any regulatory standard based on these elements would be far less arbitrary and much more informative than a uniform 6% capital-to-assets ratio. . . .*

The Basel Accord was announced in July 1988. It accepted the general concept of "risk capital," but its implementation reflected the reality of most committee decisions—that is, precision was abandoned for the sake of agreement. Under the Accord, regulatory capital was defined according to two tiers. These tiers differed in the scope of items that may be included in the definition of capital. Tier I capital was defined to include equity capital and disclosed reserves, and Tier II capital allowed undisclosed reserves, general loan loss provisions, hybrid

capital instruments, and subordinated debt to be added to the Tier I estimate. But neither of these definitions reflected precisely the concept of risk or economic capital.<sup>14</sup>

While broadly embracing the concept of risk capital, the 1988 Accord differed from the proposal offered by Bankers Trust in two significant ways:

1. In calculating capital for lending products, the Accord did not use differentiated risk factors for different obligor credit ratings.<sup>15</sup>
2. The Accord omitted market risk in the determination of regulatory capital for fear it was “too complex.”<sup>16</sup>

## V. Application of RAROC and risk management practices

The transformation of Bankers Trust from a struggling full-service bank in the mid-1970s into a highly successful merchant bank by the late 1980s is frequently studied as the classic case of a successful corporate transformation. As the details of these events have been documented in other studies, they are not repeated here.<sup>17</sup> Instead, the following paragraphs focus on the role of RAROC and risk management practices in guiding this transformation and the major events that shaped the evolutionary path of the firm.

### *New York City fiscal crisis*

In 1975 the U.S. economy was mired in recession, inflation was soaring, and New York City was in the market to raise short-term financing. Previously, Bankers Trust had won the position of lead underwriter for a major issue of tax anticipation notes (TAN). The employee representing Bankers Trust became ill, and this responsibility fell to Sanford, as head of Resources Management. Upon reviewing the documents for the underwriting, Sanford realized that the city was required to certify that it had sufficient revenues on hand to payoff the notes at the time the underwriting closed. City officials explained that their information systems could not provide up-to-date financial reports and that the necessary information would be forthcoming at the end of the next month—several weeks after the underwriting was scheduled to close. In the meantime, the financial statements provided by the city from the previous month indicated that sufficient funds had been available at that time. Furthermore, previous TAN underwritings had closed using the same “lagging” information.

Sanford balked. If the city could not make the representations required for the underwriting, he was not prepared to put the bank at risk. He offered the lead position to any other bank in the syndicate that wished to take it. No institution stepped forward. When the city published its financial reports several weeks later, it became evident that it did not have sufficient funds to redeem the notes, and the fabled New York City financial crisis unfolded. Sanford went on to

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<sup>14</sup> Tier 1 and Tier 2 regulatory capital are examples of *existing* capital whereas the minimum regulatory capital (8% of risk-weighted assets), like economic capital, is a variant of *required* capital. (See box “*Existing Capital Versus Required Capital*,” on page 8.)

<sup>15</sup> In this case, regulators opted for simplicity rather than precision. They may have been concerned that incorporating obligor credit ratings might lead to, or be interpreted as, rationing credit to borrowers. Also, some observers felt the regulators were not prepared to endorse more granular distinctions in the credit quality of sovereign entities beyond the OECD versus non-OECD distinction that was eventually accepted.

<sup>16</sup> In a separate conversation with the Federal Reserve, Bankers Trust proposed that the regulators adopt a “net duration” measure for a bank’s consolidated interest rate risk. The regulators were intrigued but decided this concept would be “too much, too soon.” Market risk was incorporated into the Accord in January 1996. In 1999, differentiated risk factors for the determination of regulatory capital for credit risk, as well as a capital charge for operational risk, were proposed as part of Basel II.

<sup>17</sup> Details of the transformation can be found in Rogers, *op cit.*, pp. 142-77.

play a leading role in the banking industry's task force to help the city regain access to credit markets.<sup>18</sup>

The New York City fiscal crisis was important in shaping Sanford as a risk manager. It reinforced his commitment to question the status quo and "business as usual" practices, and it strengthened his view that managing risk requires taking risk. Later he wrote, "In a world characterized by change, not taking risk may be the biggest risk of all."<sup>19</sup>

Sanford's role in the New York City fiscal crisis also set an example for the staff of Resources Management. Sanford put his career as a New York City banker at greater risk by pulling out of the syndicate than he would have if he had continued to lead the group despite subsequent revelations regarding the city's true fiscal condition. Yet, his actions were guided by his sense of responsibility to Bankers Trust and its shareholders. To the staff of Resources Management, Sanford's decisions in the New York City fiscal crisis exemplified two important characteristics of leaders: personal integrity and clarity of purpose. For Resources Management to become a market leader, these characteristics would be required of each individual in the department.

#### *RAROC, technology, and the build-out of Resources Management*

Compared to today's practices, early risk management applications were crude and simplistic. But Sanford and his colleagues soon realized that it didn't take a highly developed, highly calibrated RAROC model to identify significant opportunities for improving performance. The first applications of RAROC were internal to the Resources Management department. When interest rates spiked in 1974-75 and again in 1979-82, it became clear that interest rate volatility had to be managed in order for Resources Management to be successful, and RAROC provided a tool to do just that. At first, RAROC was used to run duration analysis on interest rate risk. Over time, it was applied to other risks (foreign exchange, credit, equity ownership, operating, and liquidity), and eventually the same techniques became the risk management products and solutions that Bankers Trust offered to its clients.

Until the mid-1970s, volatility in the U.S. economy and financial markets had been relatively low and market trends had been relatively easy to predict. Foreign exchange markets, however, had been different. As demonstrated by the collapse of the Bretton Woods Agreement in 1971, foreign exchange markets had defied the management and control of central governments. There was simply more risk in foreign exchange markets prior to 1973 than in domestic fixed-income markets. As a result, traders with experience in foreign exchange markets proved especially helpful in adapting to the increasing volatility of fixed-income markets in the 1970s.<sup>20</sup>

Bankers Trust made an early and steadfast commitment to maintaining technology at the leading edge, but realizing the potential of the rapidly emerging computer technologies was difficult in the early days because technology was centralized across the bank. Shortly after he became president in 1983, Sanford asked Eugene Shanks, head of the Strategic Planning department, to redesign the way technology was organized and managed within the bank with

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<sup>18</sup> Wyndham Robertson, "New York City Is Still on the Brink," *Fortune*, July 1977, pp. 122-42.

<sup>19</sup> Charles S. Sanford, Jr., "Life Value and Paradoxes of Risk," an address delivered at commencement exercises of the University of Georgia, June 17, 1989.

<sup>20</sup> One of the first traders in Resources Management to embrace RAROC concepts was John Tritz, head of the money-market desk. As a former foreign exchange trader, he had a professional trader's perspective on market volatility and market dynamics. Tritz worked closely with Sanford to design and calibrate the RAROC model so that it could be used by traders in day-to-day transactions. It might be said that Tritz "made RAROC work in the market."

the goal of making it more relevant and accountable to the business lines. Shanks selected Carmine Vona to be chief technologist, and the two men developed a strategy to create “bank-wide technology architecture” and decentralize software development teams in the individual business units. Bankers Trust is thought to be the first major financial institution to decentralized software development and move it into the business units.

The firm is also thought to be the first major financial institution to develop and make available a computer-based global communication system for employees. This predecessor to the current intranet and e-mail capabilities was conceived in the early 1980s and championed by David Sias, head of the international department. In the early years of its use, Sias was severely criticized by his colleagues for spending so much money on an IT system that was used by so few people. Fortunately for Bankers Trust, Sias persevered. In 1983-84, the system was expanded and made available to traders around the globe; its use soared. The e-mail capability was eventually renamed Tradermail. Using this technology, traders could alert one another to market events and developments so that “real time” cross-market trading opportunities were created. Over time, these capabilities were developed to enable decision-making to be kept at the local level, where traders could respond quickly to client needs, while oversight was consolidated in a central location. With central oversight of a globally consolidated book, local traders were given discretion within risk parameters monitored by management.

## **VI. Using RAROC as a competitive tool**

The Greenwich Surveys performed in the 1960s and 1970s showed that Bankers Trust had few top-tier corporate relationships. Those relationships belonged to the firms like Morgan Guaranty Trust and Chase Manhattan Bank. As a result, Bankers Trust was in a weak position to win new business when corporate customers came to the market with financing needs. Rather than fight the relationship banks head-on, Sanford chose to innovate by developing an array of new financial products and taking these products to customers.

As a precursor of things to come, in 1978 Bankers Trust challenged the Glass-Steagall Act’s long-held prohibition on commercial banks placing commercial paper. Since the 1930s, the underwriting and distribution of commercial paper had been the domain of investment banks. Bankers Trust argued that commercial paper is not a security but a loan and therefore a product that could be offered by commercial banks.

This argument reveals the early influence of RAROC in shaping Bankers Trust’s product offerings. Bankers Trust may have argued that commercial paper is a loan, but the bank was not interested in holding commercial paper issued by customers on its balance sheet. The return for holding commercial paper was low; it did not represent a productive use of the bank’s capital. Instead, Bankers Trust was interested in earning the fee for underwriting and distributing commercial paper to investors.

Although it took a dozen years and two trips to the U.S. Supreme Court to formalize the right of commercial banks to participate in this business, Bankers Trust’s ultimate victory broadened its product offerings and restored a measure of market competition that benefited every company seeking commercial paper financing.<sup>21</sup> This battle may have won Sanford the professional

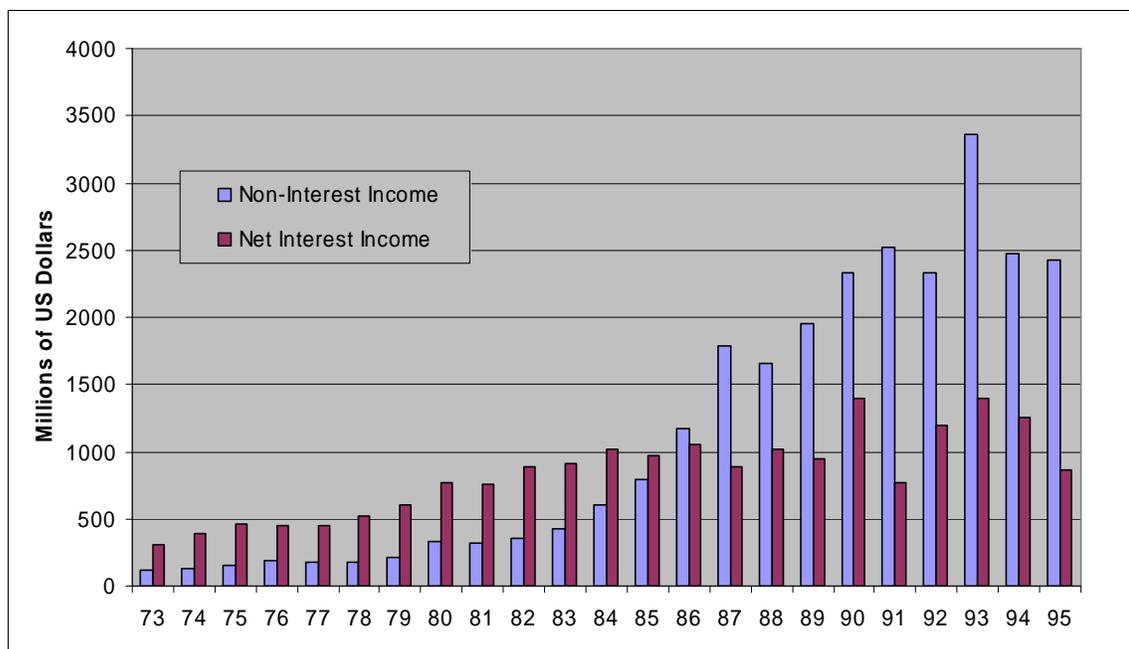
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<sup>21</sup> Bankers Trust was neither a defendant nor a plaintiff in these two cases presented before the U.S. Supreme Court. Bankers Trust had argued its position before the Federal Reserve, which had given the firm permission to place commercial paper. The legal proceedings were brought by the Security Industry Association against the Federal Reserve.

respect of members of the investment banking community, but it also identified him as a threat to their competitive position as defined by Glass-Steagall.

The revenue generated by Resources Management's bond and foreign exchange trading grew from \$20.1 million in 1977 to \$83.6 million in 1980. In 1981, *Business Week* reported, "Bankers Trust's stunning success in the securities and investment area won it consulting work and provided solid bottom line profit."<sup>22</sup>

Figure 1: Bankers Trust's Noninterest Income vs. Net Interest Income: 1973-95



Note: Data do not include charge-offs for LDC loans in 1987 and 1989.

Source: Salomon Brothers, Inc., *A Review of Bank Performance*, 1997 edition and earlier editions.

During the time Sanford was developing Resources Management into an engine of growth for Bankers Trust, the institution as a whole was staggering under the weight of huge losses in real estate lending and the competitive pressures facing its limited retail and credit card businesses. The real estate losses were particularly damaging to the bank because it had positioned itself as a leader in real estate financing and booked large exposures to real estate investment trusts (REITS) just prior to the 1974-75 U.S. economic recession. In 1973, real estate loans amounted to \$884 million, or 10.1% of Bankers Trust's total loan portfolio.<sup>23</sup>

The problems facing the bank's retail and credit card businesses were different. Although Bankers Trust had grown these businesses over the past 20 years, their growth had not kept pace in the highly competitive New York market. In addition, retail banking was facing a technology transformation with the introduction of automated teller machines (ATMs). Given its weak position in the market, lack of capital, and the heavy investment outlays required to implement this new technology, Bankers Trust found itself in a difficult position. Alfred Brittain,

<sup>22</sup> "Wholesale Banking's Hard New Sale," *Business Week*, April 13, 1981, p. 84.

<sup>23</sup> Bankers Trust's 1973 Annual Report, p. 27.

CEO at the time, recognized that the bank needed a unifying strategy that would enable it to organize its resources and build competitive positions. He called for a full strategy review. After lengthy deliberations, the decision was made to exit retail banking and credit cards and focus the firm's resources on wholesale commercial banking, which Bankers Trust called merchant banking.

When Bankers Trust announced its merchant banking strategy in 1983, it wanted to distinguish itself from other U.S. commercial banks. The term "merchant bank" was largely unknown in the United States, and it seemed to cut across the commercial bank/investment bank distinction made by the Glass-Steagall Act. Although, it sounded different and innovative, all U.S. commercial banks were severely limited in the scope and size of the investment banking activities they were allowed to develop in the early 1980s. Without initiatives under way to change the banking laws, Bankers Trust's merchant banking strategy, at the time it was announced, was more of a marketing strategy than a statement of product capabilities.

At the time of Britain's strategy review, RAROC was not widely embraced outside of the Resources Management department. While the risks and returns of the retail and credit card businesses were analyzed in this review, the information necessary to quantify these risks and consider them in an analytical model was not yet available. Although the role of RAROC was limited in this strategy review, it quickly became a guiding discipline in defining the new strategy for the bank.

#### **RAROC and compensation**

To create a corporate environment in which employees were willing to assume and manage risk, Bankers Trust broke with the traditional compensation practices of commercial banks. First, salaries were raised to be in line with those paid by the top-tier money-center and investment banks. Second, incentive compensation programs were introduced in Resources Management and then eventually rolled out to the rest of the bank.

Incentive compensation for individual employees was based on three primary variables: overall performance of the bank, performance of the department, and performance of the employee. Within this framework, two factors played a critical role in determining individual bonus compensation:

1. The need to maintain total compensation levels in each department that were on par with the market; and
2. The desire to compensate individuals for furthering the strategy and business model of the firm.

In the bonus-setting process, business line managers were asked to rank their employees. Managers were required to use a "forced ranking" in which no more than 15% of the individuals could be given a top ranking and at least 5% had to be ranked in the bottom category. Managers' assessments of individuals' performance were expected to take into account, whenever possible, the risk-adjusted return on capital (RAROC) generated either by the individual or by those activities with which the individual was associated. While there was a strong desire and a strong effort to incorporate RAROC performance into the determination of individual bonuses, the need to maintain total compensation levels for individuals on par with the market constrained how far the bank could deviate from market practices.

The size of the bonus pool available to each department was tied to the profits generated by the department, subject to adjustments made by the Office of the Chairman to support new business ventures and to protect employees in the more volatile departments. In those areas of the bank in which individual performance could be accurately measured—for example, Resources Management and Corporate Finance—very successful employees could (and did) receive total compensation that exceeded that of the chairman.

### *Rollout of RAROC to all of Bankers Trust*

Sanford was promoted to president of Bankers Trust in 1983 and as his responsibilities grew, so did the importance of RAROC. Sanford quickly set about building a risk management culture and using the impersonal, analytical framework of RAROC to cut away the encrusted irrationalities of post-World War II banking practices. Once the new standard of explicitly considering risk in business decision-making and performance measurement was introduced, it was hard to defend traditional practices.<sup>24</sup> An article published in 1985 noted, “. . . it is Mr. Sanford, in his two years as president, who has thought through and implemented much of the bank’s new money-making strategy. At an entrepreneurial bank, he is turning out to be the chief entrepreneur.”<sup>25</sup>

The first area of the bank to be addressed after Sanford became president was corporate lending. Several years earlier, Sanford had convinced himself that the size and illiquidity of corporate loans made lending far riskier than the foreign exchange and bond trading activities of Resources Management. Furthermore, loan spreads were under pressure as corporate customers were turning to commercial paper and bonds as alternative means of financing. Finally, Sanford was anxious to move the bank’s capital out of the “buy and hold” lending model and into a model characterized by “underwrite and distribute” lending and other fee-based activities.

After reviewing the customer list and exiting those relationships that did not offer a reasonable opportunity to cross-sell higher-value-added products, Sanford applied the “underwrite and distribute” model of investment banking to corporate lending. In Sanford’s mind, a loan held on the bank’s balance sheet represented “unfinished business.”<sup>26</sup>

The application of the “underwrite and distribute” model to corporate lending required the existence of a secondary market for lending products. Although banks had participated in lending transactions with one another for many years, a continuously functioning secondary market for loans did not exist. The origin of bank cooperation in lending transactions had started with large sovereign and public-sector loans in the early 1970s. At that time, when a bank received a mandate for a large loan—typically in excess of its regulatory limits or prudent limits to a single borrower—it would “syndicate” the loan by inviting other banks to take a share of the total exposure based on common terms and conditions negotiated with the customer.

In the early 1980s, however, lending to corporations was predominately a bilateral business between the borrower and its individual banks. The profitability of this business was on the decline as the most creditworthy customers were able to access financial markets directly by issuing commercial paper. For these customers, bank loans had been replaced with off-balance-sheet lines of credit. While the risks of these lending exposures were the same, the returns were significantly lower. Furthermore, the meager returns and unfunded nature of these facilities limited the number of secondary investors in this market.

The development of an independent, continuously functioning secondary market for loans coincided with the financing of leveraged buyouts (LBOs), which occurred in the period 1982-84. From the perspective of return on capital, LBO lending was potentially an attractive business for banks because these loans were mostly funded, and they generated relatively high returns

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<sup>24</sup> Despite the logic and structural consistency of the RAROC model, the insights available from it were resisted by many individuals seeking to protect the status quo.

<sup>25</sup> Robert A. Bennett, “Sanford’s New Banking Vision,” *New York Times*, March 17, 1985, Section 3, p.1.

<sup>26</sup> Carol J. Loomis, “A Whole New Way to Run a Bank,” *Fortune*, September 7, 1992, p. 80.

compared to investment-grade lines of credit. The credit quality of the borrowers, however, was typically below investment grade (credit ratings of BB or B), and this “junk” quality presented a challenge to the credit approval and risk management processes of most banks.

Bankers Trust, however, saw the development of the LBO market as an opportunity. Using RAROC, it determined that “leveraged lending” would be a good business if the bank could identify the key risks of each transaction, structure the loans to protect the bank and other investors in the event of the borrower’s deteriorating financial performance, and avoid those transactions that were not financially sound. Furthermore, because of the complexity of these transactions, the bank saw significant fees to be earned in structuring, underwriting, and distributing these lending exposures.

Bankers Trust quickly emerged as the market leader in LBO financings.<sup>27</sup> But it soon realized its success would be limited if it could not find a means to distribute or sell down the exposures that were accumulating in its loan portfolio. The development of a distribution channel and secondary market for loans became a top priority for Ralph MacDonald, head of Corporate Finance, and Timothy Yates, head of Loan Syndications. Two key issues had to be addressed in order for a secondary loan market to develop: 1) lenders had to get comfortable sharing voting rights with new investors, and 2) borrowers had to get comfortable allowing new investors into their “bank groups.”

The first attempt to distribute loans to secondary investors was via loan participations. Loan participations had been around for many years; this product had traditionally been offered to correspondent banks as a means for them to invest excess cash and deposits. Under a loan participation, the originating or underwriting bank transfers a portion of its interest in a loan under a separate contract from the original loan documentation. Typically, the participation would be for less than 100% of the loan, and the acquiring or participating bank would take a passive position with limited or no voting rights. It soon became evident, however, that situations can arise in which the interests of the originating and participating banks diverge. In such situations, the originating bank would still be responsible for fulfilling its obligations under the original contract with the borrower. In other words, loan participations did not represent true sale transactions, and there were conditions under which the full exposure of the loan and full risk of loss might return to the originating bank. In addition, loan participations were “one-off,” individually negotiated contracts with participating banks. The bespoke nature of these contracts limited the prospect of future liquidity in the secondary loan market.

Loan participations were an attempt by banks to respect borrowers’ desires to control the bank group while transferring a portion of loan exposures to other investors, thus freeing capacity for new lending. When the originating banks fully recognized that loan participations did not ensure that the risk of loss was passed to the participating bank, they stopped using loan participation agreements and adopted language in the original loan documentation that permitted true sale transactions. According to this new language, banks were permitted to “assign” a portion of the loan to a new investor subject to the approval of the borrower not being “unreasonably withheld.”<sup>28</sup> The use of true sale transactions rather than participations enhanced the liquidity of the secondary loan market and increased the attraction of this market for nonbank investors.

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<sup>27</sup> Although the sub-investment-grade credit quality of borrowers in LBO transactions attracted the concerns of regulators, these concerns declined following the strong performance of LBO loans through the 1991 recession.

<sup>28</sup> Banks had more market power in financing LBOs than they did in negotiating investment-grade lines of credit. As a result, they were able to negotiate risk mitigation and risk management features into

Bankers Trust pioneered loan sales starting in 1983 and developed a distribution network that included banks (especially non-U.S. banks), insurance companies, asset managers, and eventually prime rate funds.<sup>29</sup> Although other banks followed in short order, Bankers Trust's distribution system enabled it to lead the league tables in loans to "non-investment-grade borrowers" through the 1980s and into the 1990s, even though in many cases its capital was significantly smaller than that of its competitors.<sup>30</sup>

Loan sales benefited Bankers Trust by enabling it to boost profitability and simultaneously reduce its overall risk. An article published in 1985 noted:

*A handful of other commercial banks also sell off their corporate loans, but only as a sideline. For Bankers Trust matching investors and borrowers, rather than merely making loans and holding them in its portfolio, is becoming the core of its business. . . . In effect, the bank is taking on all the middleman aspects of investment banking without giving up a commercial bank's traditional ability to make huge loans with depositor money.*<sup>31</sup>

Between 1983 and 1995, the percentage of assets devoted to loans at Bankers Trust dropped from 58.5% to 11.2%.

Loan sales were also a big "win" for the bank's clients and the overall banking industry. It helped clients by enabling banks to increase the volume of loan origination because they did not have to hold capital to support the full amount of each loan they originated. It helped the banking industry because it created a thriving secondary market for loans—regardless of which bank originated them. The presence of a secondary market made loans more liquid and allowed all banks to diversify their loan portfolios and thereby reduce risks.<sup>32</sup>

Bankers Trust's success in loan sales led to the creation of a Loan Portfolio department in 1984-85 that was separate from loan origination and loan sales. The Loan Portfolio department owned the positions in the portfolio and was responsible for determining the post-syndication targeted hold positions and managing the financial performance of these exposures. By separating the different activities associated with lending transactions into distinct business units responsible for origination, management, and sales, Bankers Trust sought to create an

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standard leveraged loan documentation. Some of these features were later transferred to investment-grade lending.

<sup>29</sup> Prime rate funds are 1940 Act mutual funds that invest in corporate loans and thereby enable private individuals to invest directly in a pool of corporate loans.

<sup>30</sup> According to Kevin Burke, a founding member of the Loan Sales unit in the early 1980s, Bankers Trust not only led the industry in the origination of loans to "non-investment-grade borrowers," but was the first bank to originate and distribute the full notional amount of individual lending facilities to third-party investors. In the old "buy and hold" model of lending, the notional size of a loan was an indication of the bank's view of the borrower's creditworthiness. Bankers Trust argued that there was no such practice in bond or equity underwritings by investment banks and there was no need for this practice in lending. Furthermore, it pointed out that the bank often had exposure to the borrower from other products, and by selling the loan and freeing capital, it would be better positioned to help the client in the future.

<sup>31</sup> Robert A. Bennett, "Sanford's New Banking Vision," *op.cit.*

<sup>32</sup> Richard Rosenberg, chairman of Bank of America from 1990 to 1996, commented on Bankers Trust's performance during the 1990-91 recession, noting that "10% percent of his [Sanford's] loan portfolio was non-performing, and it had zip impact on their performance." From Martin Mayer, *The Bankers: The Next Generation* (New York: Truman Talley Books/Dutton, 1997), p. 264.

organizational structure in which the performance of each unit could be measured and the old “buy and hold” model of commercial lending would be superceded by rational decision-making, including the choice of holding or selling individual positions. Bankers Trust is thought to be the first bank to create a loan portfolio business unit that owned the lending exposures and was responsible for their financial performance. It is also thought to be the first bank to use the title “loan portfolio manager.”

In the early days of loan portfolio management, most of the active management focused on loans to non-investment-grade customers—that is, leveraged loans or loans associated with LBOs. The mostly funded nature of these loans and their relatively high returns attracted both bank and nonbank investors, which facilitated the development of a functioning primary syndication market. The investment-grade loan market, however, was a different story. The largely unfunded nature of these lending facilities (largely commitments or revolving credit lines) meant that they did not earn sufficient returns to attract a broad nonbank investor base. So the primary reason that banks participated in this market was to facilitate the cross-selling of higher-value-added products. Alternatively, they might have been unaware of the return/risk characteristics of these facilities or unwilling to change their existing business models.

Although the investment-grade lending market was quick to accept the practice of underwriting and syndicating large facilities, the liquidity in this market quickly disappeared when the primary syndication was completed.

Recognizing the need to create liquidity in the investment-grade corporate loan market and in the secondary market for leveraged loans—and seeing the economic opportunity available to the innovating firm—Bankers Trust moved Allen Levinson, an experienced bond trader, out of Global Markets to head the Loan Portfolio department in 1988. Levinson was expected to bring a trading culture to managing the loan portfolio and to facilitate the development of new products for managing credit risk.

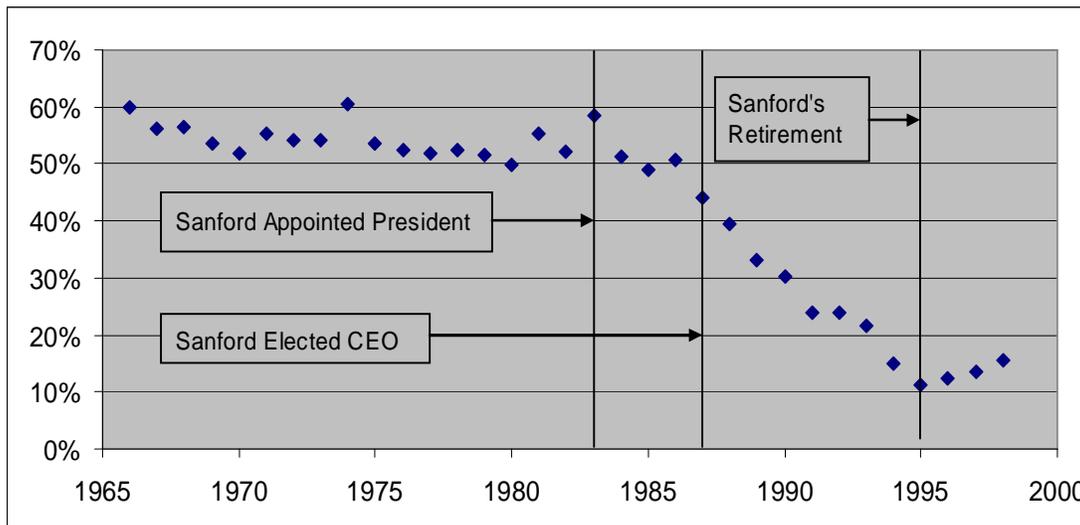
In retrospect, Levinson correctly identified the path that the practice of loan management would follow, but he was approximately 10 years ahead of his time. First, Levinson attempted to securitize a portion of Bankers Trust’s large corporate loan portfolio and went so far as to engage in discussions with the ratings agencies. These securitizations did not take place, largely because the ratings agencies did not feel they had sufficient experience or historical data to assign acceptable credit ratings to the securities issued in such transactions.<sup>33</sup> Second, Levinson worked closely with Peter Freund and other colleagues at Bankers Trust in the early development of credit derivatives—that is, derivatives structures that would enable a loan portfolio manager to retain ownership of loans and thus retain valuable customer relationships but also buy protection on the possibility that customers might default on the financial obligations of the specific loan contracts.<sup>34</sup> While early credit derivatives transactions were completed in 1991, the credit derivatives market did not develop critical mass until the banking industry began to actively manage their economic and regulatory capital in the 1997-98 period. Levinson left the Loan Portfolio department to return to trading in 1992. In the years that followed, however, both loan securitizations and credit derivatives became standard tools in the arsenals of loan portfolio managers.

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<sup>33</sup> The first securitization of a commercial loan portfolio was Rose Funding, completed by National Westminster Bank in 1996.

<sup>34</sup> See text box “Credit Derivatives: Early Pioneer,” p. 29.

Figure 2: Bankers Trust's Loans as a Percentage of Total Assets, 1966-98



Source: *Bankers Trust Annual Reports, by year.*

The same reasoning that led Bankers Trust to create the Loan Portfolio department also led to the reorganization of its transactions-processing operations. Traditionally, transaction processing had been a service offered as an appendage to lending relationships, but the application of RAROC to individual business units required that revenue be attributed to specific risks incurred by the unit. In 1985, the activities relating to client transaction processing were organized into a separate department named PROFITCo. Organizing these activities into a single profit center gave Bankers Trust's managers control over costs, pricing, product design, and delivery. In addition, it enabled the bank to benchmark PROFITCo's performance to the market, thereby providing an objective measure of whether this unit created value for shareholders. Bankers Trust was the first bank to restructure its processing services. Other money-center banks soon followed its lead.

#### *The LDC crisis and Sanford's appointment to CEO*

When Sanford was promoted to president, it was widely assumed that he held the inside track to succeed Brittain as CEO. Yet no money-center bank had ever elected a CEO who had risen through the ranks from the trading or funding side of the bank. At that time, all money-center bank CEOs had built their careers in corporate lending. An event likely to have played a significant role in convincing the board to tap Sanford for the CEO position when Brittain stepped down in 1987 was the less developed country (LDC) crisis.

The origins of the LDC debt crisis lay in the international expansion of U.S. banking firms during the 1950s and 1960s in conjunction with the world economy's rapid growth. This growth generated U.S. corporate investment in the less developed countries, and the largest banks responded by establishing a global presence to support these activities with loans and other financing products. The expansion in international lending was accelerated by the rise in crude oil prices that began in 1973 and continued for almost a decade. These price movements created a serious balance-of-payments problem for LDCs by increasing the price of oil and other imported goods. For those banks recovering from the real estate bust of the mid-1970s, both the growth in international lending and the recycling of "petro dollars" to LDCs in the form of loans were received with enthusiasm—until the bubble burst.

### **RAROC and the business model of commercial banking**

In the early days of RAROC, there was an impassioned debate within Bankers Trust about the relative risk of lending versus trading products. Since lending was the primary activity of commercial banks, most individuals thought loans were less risky than trading products; after all, traders could lose money quickly and loans appeared to be stable in value. Of course, there was always the remote possibility that a loan might default, but the conventional wisdom of the time maintained that a good credit officer could select borrowers and structure loans to avoid defaults. The mark-to-market accounting for most trading products and the historical cost accounting for loans, together with the absence of long time-series data on performance, prevented any rigorous investigation of this issue until Dan Borge developed a methodology that enabled the risk of lending and trading products to be analyzed in a consistent analytical framework.

Using RAROC, Bankers Trust realized that the notional size, the long-term (multiyear) contractual maturity, and the illiquidity of loans made them far riskier than disciplined trading operations. The key issues that limited the risk of trading operations were the liquidity and the real-time information generated by markets that enable traders to assess and adjust their positions continuously.

In addition, Bankers Trust found that the price generally charged for loans was low relative to their risk. In other words, it was difficult to achieve the prescribed risk-adjusted return with lending products. As the commercial paper market developed in the 1980s, investment-grade customers reduced their use of loans and increased their use of unfunded commitments as backup lines for the issuance of commercial paper. The loss of the net interest margin without a significant reduction in the risk of the commitment compared to the loan made it increasingly difficult to earn attractive returns in the lending business without moving down market and taking more credit risk. Sanford referred to this development as “the downward spiral of the credit business.”<sup>35</sup>

The insights that RAROC offered were disturbing to individuals who had built their careers in traditional lending. Some of these individuals chose to view RAROC as a black box that had been rigged by mathematicians. Others characterized it as a political tool designed to steer the bank away from traditional commercial banking activities and toward new products and new activities. And practically all of these individuals recognized it as a threat to their positions and ultimately to their careers.

Outside of Bankers Trust, RAROC was largely ignored by other commercial banks throughout the 1970s and most of the 1980s. During this time, there were many misconceptions and criticisms of the RAROC model and its use. For example, it was said that “Bankers Trust lets the RAROC model make business decisions” and “RAROC destroys relationships and creates a transaction mentality.” Eventually, managers in peer institutions came to recognize the superior financial performance of Bankers Trust, but still clung to the view that “RAROC won’t work here.”

By exposing the relatively high risk and low risk-adjusted profitability of traditional commercial banking products, RAROC revealed the need for the banking industry to develop new products, to create new markets, and to define a new business model.

In August 1982, Mexico defaulted on its foreign financial obligations. In the following months, U.S. money-center banks watched in horror as other LDCs followed Mexico’s example. By October 1983, some 27 countries owing \$239 billion had rescheduled their debts or were in the process of doing so.<sup>36</sup> Even as these events were unfolding, Walter Wriston, chairman and chief executive of Citicorp, wrote in a newspaper article, “A country does not go bankrupt.” The serious point of Wriston’s comment was that poor cash flow, not insolvency, was the root of the

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<sup>35</sup> Charles S. Sanford Jr., “Today’s Bank in the Marketplace of Tomorrow,” an address delivered at the 33rd Annual Meeting of the International Monetary Conference, Boston, June 3, 1986.

<sup>36</sup> Informal estimates concluded that many of the large U.S. money-center banks would have been insolvent if they had reported all their positions on a mark-to-market basis at the time the LDC crisis unfolded.

debt crisis. He had a point, but his point did not change the reality of the situation. As long as borrowers refused to meet their financial obligations, their loans were in default.<sup>37</sup>

To stabilize international markets and avert political aftershocks, the Federal Reserve intervened and discouraged large U.S. banks from writing down these defaulted assets. The banks were given time to accumulate reserves so the situation could be addressed in a more orderly fashion at a future date. Finally, in early 1987, the Federal Reserve relaxed its position and allowed large U.S. banks to write down these positions. It then took several years for meaningful valuations to be determined.

It is reasonable to assume that this painful experience in LDC lending, on the back of the losses incurred in real estate lending the decade before, left Bankers Trust's board reluctant to consider a candidate whose career had been built on corporate lending, and on July 1, 1987, Sanford was named chairman and CEO of Bankers Trust. In an ironic turn of events, the responsibility for proposing a \$636 million after-tax write-off on LDC loans fell to Sanford in his first board of directors meeting as CEO.<sup>38</sup>

From his position as CEO, Sanford continued to drive change, promote entrepreneurship and innovation, and challenge the status quo—both within Bankers Trust and increasingly across the financial services industry. He emerged as a leading critic of the Glass-Steagall Act, arguing that:

*Glass-Steagall is a divine right for investment bankers to make a lot of profit. That's all it is. Without it, profits would be distributed more widely. . .*<sup>39</sup>

and pointing out that:

*. . . underwriting corporate securities is far less risky than lending. Underwriting risk is brief, more easily hedged, and simpler to liquidate than loans. No bank failure ever stemmed from underwriting securities.*<sup>40</sup>

Under his watch, Bankers Trust was among the first commercial banks to enter into the corporate securities business as soon as this activity was permitted by the Federal Reserve. Bankers Trust was allowed to underwrite and trade revenue bonds and asset-backed securities beginning in 1987, to underwrite corporate bonds in 1989, and to underwrite equities in 1991.

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<sup>37</sup> Studies of the LDC crisis have argued that Mexico and a number of other Latin American countries chose to repudiate these debts. In other words, these countries were not bankrupt. If they had imposed draconian measures, they could have adjusted their balance of payments to meet their debt service requirements, but at great hardship to their domestic economies. These studies also point out that it was economically rational for these countries to choose repudiation and force debt rescheduling—and it was myopic of the banks to not have anticipated this course of action.

<sup>38</sup> Sanford expected the \$636 million after-tax write-off taken in 1987 to be sufficient to cover all losses on existing LDC loans. By 1989 it became clear that this write-off would not be sufficient, and the bank was forced to take an additional write-off of \$1.6 billion. As noted in the section on innovation risk and reputation risk (p. 35) both of these write-offs resulted from loans put on the books prior to 1983 and do not reflect the strategies developed under Sanford's leadership.

<sup>39</sup> J. P. Donlon, "The Bishop of Merchant Banking," *Chief Executive*, September/October 1987.

<sup>40</sup> Charles S. Sanford Jr., "Today's Bank in the Marketplace of Tomorrow," *op.cit.*

### *Architect of the modern use of derivatives*

The transformation of Bankers Trust was built on a strategy of risk management, product innovation, the productive deployment of capital, and the development of new markets. No product fit into this overall strategy better and facilitated the transformation of the bank more effectively than derivatives.

Financial derivatives were not new; they had been around in various forms for centuries. One problem with derivatives was that they were difficult to value. That changed in the 1970s: Advances in financial theory and the declining cost of computer processing reduced the problem of valuing derivatives. The rigorous mathematical underpinnings and the computer intensity of these products made them a comfortable fit for the staff and infrastructure being built in Resources Management.

Derivatives technologies enable traditional products to be unbundled into risky cash flows and repackaged to address the interests of individuals or classes of investors. It is most common for these risky cash flows to be repackaged into categories of pure risk that are easily recognized in the market. The first application of modern derivatives was in managing interest rate risk.

In the early days of interest rate swaps, it could take several months to put together and execute a trade. Once a client with a particular interest was found, a counterparty with identically opposite needs had to be identified so the parties could be paired together in “back-to-back” transactions. Only at that point did the long and tortuous process of negotiating and agreeing on terms of the transaction and its price actually begin. The difficulty in finding both parties and negotiating the documentation for the transactions limited both the number and complexity of the trades.

Since Bankers Trust had a trading culture and the ability to quantify risks explicitly with its RAROC methodology, in 1982-83 it began accepting one side of a trade on its own books before the other side was found (or maybe was never found). The bank then used market instruments to offset this risk and retained only the residual market risk resulting from imperfect hedges and counterparty credit risk. This innovation enabled its volume of trading activity to surge without requiring that the bank accumulate a significant amount of risk. It also enabled derivatives to be tailored to a customer’s specific needs.<sup>41</sup> These innovations in managing the risk of trading products opened a new market with seemingly unlimited opportunities for innovation and growth. Bankers Trust went on to introduce a dazzling array of new products—among them “exotic” structures (such as barrier options), equity derivatives,<sup>42</sup> currency derivatives, commodity derivatives, insurance derivatives, and credit derivatives.<sup>43</sup> Rapid product innovation in derivatives offered Bankers Trust the opportunity to gain access to the top-tier customers of financial services without having strong relationships.<sup>44</sup>

Derivatives created a sea change in the way companies do business. Using derivatives, companies are able to take a more realistic view of risk—recognizing that value and risk are

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<sup>41</sup> “The Risk 20 Awards,” *Risk*, July 2007, p. 56.

<sup>42</sup> “Going Against the Grain,” *Risk*, April 1988, pp. 6-7, and “The Risk 20 Awards,” *Risk*, July 2007, p. 60.

<sup>43</sup> William Falloon, “Freudian Analysis,” *Risk*, December 1997, pp. 60-62.

<sup>44</sup> From the mid-1970s to the mid-1990s, Bankers Trust was often referred to as a product-driven institution without strong customer relationships. There was truth in that statement. Rapid product innovation offered Bankers Trust the means to gain quick access to top-tier customers; relationships were expected to follow.

### **Credit derivatives: Early pioneer**

By the late-1980s Bankers Trust's was widely recognized as a market leader and innovator in derivatives products. It had been at the forefront of the development and introduction of interest rate derivatives, "exotic" structures (such as barrier options), equity derivatives, currency derivatives, commodity derivatives, and insurance derivatives. The next untapped opportunity for derivatives was clearly credit, but the primitive state of credit markets presented formidable obstacles to any entrepreneur attempting to develop this market.

In the winter of 1991, Peter Freund, who was managing the swaps, foreign exchange, and commodity books for Bankers Trust in London, decided to accept this challenge. He assembled a team of specialists and set to work. This effort was supported by Allen Levinson from the Loan Portfolio department, who saw the potential of credit derivatives as a distribution channel for managing the concentration risk as well as economic and regulatory capital of the loan portfolio. He also saw it as an opportunity to create capacity for new lending business while preserving customer relationships.

In 1991, Bankers Trust booked the first credit derivative transactions.

- One early transaction was a credit default option that enabled Bankers Trust to reduce its credit exposure to Japanese banks.
- Another transaction was a total return swap between Bankers Trust and Mellon Bank that enabled Mellon to continue lending to a long-standing corporate client without increasing its credit exposure to this customer.

Although, not sizable trades, these early transactions identified a number of obstacles that had to be addressed before the credit derivative market could take off, including basis risk between the hedge and the underlying, correlation between the hedge and the underlying and the accounting and regulatory treatments for the credit derivatives themselves. But the problem that baffled these early pioneers most was the unwillingness of most lending officers and credit officers to think about credit in the context of a market. In an interview in 1997, Freund said,

*The typical lending officer/credit officer is focused not on the mathematics of the portfolio management of credit risk in any kind of sophisticated fashion but rather in this hidebound, traditional sort of way. . . . No individual company would ever self-insure a factory, and yet many of them are riding naked as far as credit exposure to their biggest customers is concerned.<sup>45</sup>*

The credit derivatives market was slow to develop, and Freund found it increasingly difficult to keep his team together in the face of other, more immediate opportunities. In 1994, Freund left the credit derivatives market to establish a company specializing in transactions processing security. Although Bankers Trust continued its participation in the credit derivatives market, leadership in this market passed to J.P. Morgan. J.P. Morgan dedicated substantial resources to the development of standard documentation. It also deployed credit derivatives to reduce the credit risk of its loan portfolio—thus providing a demonstration effect for other potential users in the market.

Looking back on his experience as a member of Freund's initial team, John Chrystal said:

*We really underestimated the organizational changes that would have to go on in financial institutions. Credit derivatives really changed credit risk management. The range of considerations expanded from lend/don't lend to buy, sell, short, arbitrage.<sup>46</sup>*

By unifying what traditionally had been stand-alone products further separated by currency, asset types, and local market practices, credit derivatives have given traditional investors in credit new tools to manage their positions and new products in which to invest. They have also facilitated the development of new credit products with bespoke risk/return characteristics to attract new classes of investors. In short, credit derivatives both enabled the creation and support the continued growth of today's global credit market.<sup>47</sup>

<sup>45</sup> William Falloon, "Freudian Analysis," *Risk*, December 1997, p. 62.

<sup>46</sup> *Ibid.*, p. 61.

<sup>47</sup> Rachel Wolcott, "Incredible Credit," *Risk*, July 2007, pp. 80-83.

inextricably linked and acknowledging that they can preserve and enhance value by managing risks. In 1990, Bankers Trust set up a Risk Management Advisory Group to work with clients in analyzing risks, isolating risks into component parts, and assessing how risk adds to or impairs value. By managing the individual *components* of risk embodied in a product rather than managing the aggregate risk of the product, Bankers Trust was able to produce more flexible and more efficient solutions for customers.

In the early 1980s, even before the creation of Global Risk Management, Bankers Trust realized that the increasing sophistication of its trading business dictated the need for specialists who were well grounded in accounting practices and policies but also comfortable working with analytical models, interacting with front-office quantitative analysts, and representing central risk and operations functions. In 1984, the bank moved Salvatore Iannuzzi from Central Controlling into Resources Management and charged him with the task of building what is thought to be the financial services industry's first Product Control function. The responsibilities of this department included basic accounting at the product and business-unit levels, analyzing complex structures to verify pricing and ensure proper processing, investigating pricing models to ensure their validity and calibration, and verifying accounting practices to ensure that the rules applied to individual products and transactions were consistent with relevant external and internal accounting standards. Furthermore, members of the Product Control team were given the position and stature to challenge business managers all the way up to the heads of the business units. Today, product controllers, or business area controllers, are found in all major financial institutions.

#### *Enterprise risk management*

As regulatory limitations were removed, Resources Management expanded its activities to include the trading of corporate bonds, derivatives, and equities. In 1985 the department was renamed Global Markets.<sup>48</sup>

In 1987, Global Markets created the Global Risk Management unit, headed by Dan Mudge. This unit was charged with the responsibility of setting position limits as well as measuring, monitoring, reporting, and overseeing the product and geographic risks of all Global Market's business units. Leveraging the experience gained in developing the IT platform for the global derivatives business, Global Risk Management set about building a global IT infrastructure and calculation engine necessary to fulfill its mandate. On December 10, 1987, it produced its first comprehensive risk and price volatility report for all Global Markets businesses. This report was moved into daily production in early 1988.<sup>49</sup> It included all positions and estimates of price volatility (later called value-at-risk) and measures of risk by type (such as foreign exchange, interest rate, equity, etc.) as of the close of business from the previous day for all geographic regions. This information was then used in the monthly calculation of economic capital and RAROC.<sup>50</sup>

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<sup>48</sup> Between 1983 and 1985, Resources Management was headed by John Tritz. In 1985, Tritz retired and Eugene B. Shanks Jr. became head of the department. Resources Management continued to report to Sanford in his position as president of the bank.

<sup>49</sup> According to information from the RiskMetrics Group, shortly after Dennis Weatherstone became CEO of J.P. Morgan in January 1990, he realized he "did not know the total risk of his firm. He asked that a report measuring and explaining those risks be placed on his desk everyday at 4:15 p.m." The date of this request suggests that Bankers Trust was well ahead of J.P. Morgan in measuring and reporting the global risk positions of the firm.

<sup>50</sup> Since economic capital and RAROC are commonly calculated over a one-year horizon, monthly reporting of these figures was deemed sufficient.

### **RAROC, value-at-risk, and mark-to-market**

RAROC was developed in the early 1970s as a conceptual framework for organizing information to support business decision-making. It grew out of the trading unit of Bankers Trust and was firmly grounded in market prices and real-time performance measurement. Over time, the firm embraced RAROC as a competitive tool for reshaping its strategy, reallocating capital, and improving long-term profitability. By the late 1980s, Bankers Trust had applied RAROC to all the major product areas of the bank and the firm was well on the way to putting in place the first enterprise-wide risk management function.

In the late 1980s and early 1990s a number of consulting firms started marketing RAROC models as stand-alone “products.” These products were quickly embraced by trading units in financial institutions where market prices were readily available and risk measurement was relatively straightforward.

In 1995-96 the Basel Committee undertook the task of introducing market risk into the 1988 Accord. In an effort to influence this emerging regulatory standard, Morgan Guaranty Trust Company gave away a version of its internal market risk methodologies. These methodologies were firmly rooted in RAROC, but they were released under the name *value-at-risk*. The speed with which these methodologies were embraced by market participants encouraged regulators to adopt similar methodologies for the market risk amendment to the Accord. It also branded these methodologies as value-at-risk instead of market risk RAROC.

Commercial banks were slower to embrace credit risk RAROC. The historical illiquidity of credit products and the length of credit cycles made credit risk difficult to measure. It was not until after the recession of 1990-91 and the development of expected default frequencies (EDFs) by KMV Corporation that the banking industry at large began to embrace the principles of RAROC in managing the credit risk of their loan portfolios. During this time, the term RAROC became closely associated with a class of models that calculates the net present value of a loan portfolio from actuarial data and then benchmarks this return to the economic or risk capital required to cover the portfolio’s unexpected losses at a specified confidence interval.

The growth in credit markets over the past decade is now enabling market participants to move away from models based on actuarial parameters to models that use observed credit spreads from the market. Practitioners frequently describe this evolution in credit risk modeling as “moving from RAROC to mark-to-market.” This terminology is inconsistent with the principles and spirit of the original RAROC model, which was based on market valuation, or an approximation thereof, and designed to measure market returns relative to market risk. The calculation of RAROC from historical (accrual) prices or model prices derived from actuarial parameters did not become common until the early 1990s, when RAROC was popularized outside of Bankers Trust and applied to bank loan portfolios. The fact that some practitioners have continued to use historical (accrual) prices long after market prices for credit risk of loans have become available is not only inconsistent with the original RAROC model, but it is a sub-optimal business practice.

As a result of its advanced market risk management practices, Bankers Trust was the first U.S. bank and among the first banks worldwide to receive permission from the regulators to adopt internal models for the determination of market risk capital for regulatory reporting. This approval was granted on March 31, 1997.<sup>51</sup>

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<sup>51</sup> The amendment to the 1988 Accord requiring minimal capital requirements for market risk, the Market Risk Amendment (MRA) was adopted in January 1996 and became effective on January 1, 1998. Bankers Trust and a select number of banks from other regulatory jurisdictions were permitted to early-adopt the MRA prior to its effective date.

In 1989-90, credit risk was added to the monitoring and reporting responsibilities of Global Risk Management. At that point, Bankers Trust had operational risk management systems for tracking market risk and credit risk. The next question was: What's missing?

In the earliest days of RAROC, liquidity risk had been identified as a separate risk factor, but this factor had proven difficult to quantify in an objective manner. In 1990, the firm started capturing risks of a nonmarket and noncredit variety—to find out what else “might be out there” and, at a later stage, to develop procedures for measuring these risks.

Under the direction of Douglas Hoffman, who worked in Internal Audit, a project was developed to ask key managers about the loss scenarios most likely to “keep them awake at night.” The exercise involved a systematic analysis of risk identification, identification of past losses, assessment of projected probabilities of occurrence, frequencies and severities, risk insurance in place, and most important of all, effective response measures. These risk identification and assessment surveys resulted in a large inventory of nonmarket and noncredit risk classes that were eventually grouped under the heading of operational risk. The methodology for identifying, measuring, and monitoring operational risk that was developed at Bankers Trust in the early 1990s is clearly evident in the operational risk rules of Basel II.<sup>52</sup>

In 1994, Bankers Trust formally integrated operational risk into its capital attribution and risk-adjusted profitability analysis. By early 1995, the staffs of each of the risk departments (market risk, credit risk, and operational risk) were moved to the same location and their operations were transferred onto a common IT platform. Although the responsibility for these functions was divided between Dan Mudge and Joseph Manganello, the chief credit officer, Bankers Trust was the first global bank to centralize and integrate all risk functions. This organizational structure is commonly found in financial institutions today under the direction of a chief risk officer.

## **VII. Innovation risk and reputation risk**

Although innovation is the engine that drives economic growth and wealth accumulation in market economies, it also carries risk. Innovation risk arises from the same characteristic that creates reward for the innovating firm—the newness of the innovation.

Before introducing new products to the market, the innovating firm must try to imagine all possible ways in which these products might be misused. It must develop controls to protect customers in these hypothetical circumstances. Thus, every new innovation has the potential to add another layer of controls and another set of regulations in the market. Moreover, innovating firms are unlikely to predict all potential misuses of new products, and they are unlikely to foresee all potential controls necessary to prevent the improper use of new products. Until the innovation and all the problems that might arise from it are fully understood, the innovating firm is exposed to reputation risk.

Bankers Trust encountered innovation risk and reputation risk in its leveraged derivatives business in the mid-1990s.<sup>53</sup> It was not the only bank to run into these problems. Others, such as Merrill Lynch and CS First Boston, were also embroiled in lawsuits, while firms like J.P. Morgan were careful to resolve their problems outside of the courts.<sup>54</sup>

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<sup>52</sup> Douglas G. Hoffman, *Managing Operational Risk* (New York: John Wiley & Sons, Inc. 2002).

<sup>53</sup> Leveraged derivatives were first identified as a separate business unit at Bankers Trust in the early 1990s. This business unit never accounted for more than 5% of Bankers Trust's total annual revenue.

<sup>54</sup> “Blurred Vision,” *The Economist*, April 8, 1995, pp. 67-68.

Whereas worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally,<sup>55</sup> Bankers Trust had chosen to be an unconventional institution. “To be agents of change, not guardians of the status quo” had been a guiding principle in Bankers Trust’s transformation over the previous 20 years, starting in Resources Management and then encompassing the entire firm. Bankers Trust had pioneered new products and new markets. It had transformed commercial lending from a “buy and hold” model to an “underwrite and distribute” model. It had led the campaign to change banking laws and increase competition in the financial institutions sector. And as its profitability increased, it rose from a struggling, second-tier bank to take its place among the elite on any short list of the top international banks. Although its success may have earned it the respect of its peers and regulators, it was not accepted as a role model by conventional bankers.<sup>56</sup> It was viewed as different, an outsider that did not want to “join the club.” So when the problems with leveraged derivatives developed, Bankers Trust was quickly isolated as the logical target.

In early 1994, the Federal Reserve tightened monetary policy in a pre-emptive strike against inflation. Interest rates rose, and fixed-income positions plummeted in value. Bankers Trust’s customers were not immune; they, too, experienced losses. In late 1994, several customers complained. Bankers Trust investigated the complaints, as did an independent counsel jointly appointed by four government regulatory bodies: the Commodity Futures Trading Commission, the Federal Reserve Bank of New York, the New York State Banking Department, and the Securities and Exchange Commission.<sup>57</sup>

After an 18-month investigation, the independent counsel released its report on June 30, 1996. Its finding was that:

*Bankers Trust, as an institution, never acted in reckless disregard of any of its duties. Indeed, as an institution, Bankers Trust placed a high premium on customer service and ethical business dealings.*<sup>58</sup>

The independent counsel’s report did, however, cite deficiencies in the guidance, management, and control of the business-line derivatives personnel that allowed:

*. . . certain individuals . . . to engage in conduct that the independent counsel found to warrant severe criticism.*<sup>59</sup>

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<sup>55</sup> John Maynard Keynes, *The General Theory of Employment, Interest, and Money* (London: Macmillan and Company, Ltd., 1970), p. 158.

<sup>56</sup> When asked to name the bankers that he most admired, Hilmar Kopper, then speaker of the managing board of Deutsche Bank, replied, “I have high regard for . . . Charlie Sanford at Bankers Trust for the way he has turned that bank around, having burnt the bridges behind him. He has shown incredible courage and determination, and it has been a success. I do not want to copy him: we are as different as individuals as we are as banks. But I appreciate what I see . . .” From Padraic Fallon, “The Battle Plans of Hilmar Kopper,” *Euromoney*, January 1994, pp. 28-44.

<sup>57</sup> Derivatives cut across traditional product definitions. Depending upon how they are structured, some derivatives might be interpreted as securities, some might be commodity futures, and some might be neither. These features of derivatives created uncertainty among different regulatory bodies. In the early 1990s, it was not clear which of these bodies was or would become the primary regulator for derivatives.

<sup>58</sup> Derrick D. Cephas and Benjamin R. Civiletti, “Executive Summary and Recommendations of the Report on the OTC Derivatives Business of Bankers Trust During 1991-1994,” presented to Bankers Trust New York Corporation, Bankers Trust Company, BT Securities Corporation, the Commodities Futures Trading Commission, the Federal Reserve Bank of New York, the New York State Banking Department, the Securities and Exchange Commission, June 30, 1996, p. 3.

The objectionable conduct noted by the independent counsel had been identified by Bankers Trust's management in its own investigation, and two individuals who had engaged in this conduct had been dismissed from the firm before the findings of the independent council were released. Bankers Trust agreed to pay a fine of \$10 million for the actions of these individuals without the institution admitting or denying guilt. By the time the report was published, each of the complaints concerning Bankers Trust's leveraged derivatives business had been addressed and settled. No other fines were levied against Bankers Trust in connection with any derivatives products.

Coincident with the complaints raised about its leveraged derivatives business, Bankers Trust experienced losses in its Latin American department and recorded a quarterly loss of \$157 million in the first quarter of 1995. The losses from the Latin American department were unrelated to the leveraged derivatives business. The combination of these events, however, pulled the Bankers Trust share price down from a high of \$84.25 in February 1994 to \$50.63 in March 1995. The firm returned to profitability in the second quarter of 1995, and during the final two quarters of 1995, its net income averaged an annual "run rate" only 14% below the annual figure for 1994.<sup>60</sup> When the report of the independent counsel was published on June 20, 1996, the stock price stood at \$73.88.

Sanford retired from Bankers Trust in April 1996 after a career of almost 36 years with the firm. He had informed the board of directors of his intention to step down at that time in the summer of 1993, and his plans were made public in May 1995.<sup>61</sup> He was succeeded by Frank Newman, who had joined the firm in the summer of 1995 as chief financial officer and senior vice-chairman in charge of administration.

Under Newman, the financial performance of Bankers Trust continued to recover. By year-end 1996, the stock price had returned to its previous high. In 1997, Bankers Trust posted an after-tax return on equity of 15.6%, up from 12.9% the year before. The share price hit an all-time high of \$130.37 in December of that year and then continued its upward climb in early 1998. It peaked at \$136.32 on April 22, 1998 before falling back to \$116.06 at the end of the second quarter.

During the period from mid-1996 through early 1998, Bankers Trust completed three significant acquisitions to strengthen its investment banking franchise.<sup>62</sup>

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<sup>59</sup> *Ibid.*

<sup>60</sup> According to Timothy Yates, who served as chief financial officer of Bankers Trust from 1990 through 1995, the firm experienced net losses in the first four months of 1995. The greatest contributor to these losses was the Latin American department as a result of a foreign currency trade that was not related to the leveraged derivatives business. Throughout this period, the derivatives business remained profitable. Bankers Trust returned to profitability in May 1995 and posted a gain in net income of \$79 million in the second quarter of that year.

<sup>61</sup> Minutes of the meeting of the board of directors of Bankers Trust New York Corporation, May 16, 1995. Also, letter from Jon M. Huntsman, chairman and CEO of Huntsman Chemical Corporation and former member of the board of directors of Bankers Trust New York Corporation, to James W. Michaels, editor of *Forbes*, January 28, 1998.

<sup>62</sup> Negotiations with Wolfensohn & Company and Alex. Brown, Inc. had been initiated while Sanford was chairman of Bankers Trust. While it was recognized that Wolfensohn & Company would enhance Bankers Trust's mergers and acquisitions capabilities, the two parties were not able to agree on price. Alex. Brown was a different story. According to Yves de Balman, who led these negotiations for Bankers Trust, Alex. Brown's strong position with young growth companies was viewed as a natural fit for

- In August 1996, Bankers Trust acquired Wolfensohn & Company, creating BT Wolfensohn Mergers, Acquisitions & Corporate Advisory Group. The move reinforced the bank's ability to compete in the mergers and acquisitions field.
- In September 1997, Alex. Brown Inc. was merged into a wholly owned subsidiary of Bankers Trust New York Corporation (the bank holding company). The merger with Alex. Brown created BT Alex. Brown and strengthened Bankers Trust's standing in equity underwriting, research, and distribution.
- In December 1997, Bankers Trust agreed to acquire NatWest Markets' Pan-European cash equities business. The acquisition, which was completed in the second quarter of 1998, expanded Bankers Trust's equity research capabilities in the United Kingdom and across Europe.

The firm's fortunes changed abruptly in the third quarter of 1998, when the Russian crisis broke and the Asian crisis spread across the Pacific rim. Between July 14 and October 7, 1998, Bankers Trust's share price plummeted from \$120.63 to \$49.19 as rumors of significant losses began to circulate. When the financial statistics for the third quarter of 1998 were released on October 23, Bankers Trust revealed losses in net income of \$488 million, a number "far worse" than analysts had expected.<sup>63</sup> On November 30 of that year, Newman signed a definitive agreement to sell the firm to Deutsche Bank AG for \$93.00 per share of common stock. This transaction was concluded on June 4, 1999, with Bankers Trust recognizing an additional \$1.95 billion in losses in the second quarter of 1999.

The financial losses and sale of Bankers Trust in the late 1990s is one of the great ironies of modern financial history. The firm that had pioneered the development of objective, analytical risk management tools, that had advocated a strategy of embracing and managing risk rather than avoiding risk, and that had successfully transformed itself from an ill-focused, near insolvent commercial bank into a well-capitalized, highly profitable wholesale financial institution fell victim to the very forces it had sought to manage. The sequence of events that led to the sale of Bankers Trust in 1999 raises the inevitable question: If Bankers Trust was so good, what happened?

The first issue to consider is one of responsibility. Analysis of the losses that Bankers Trust reported in the third quarter of 1998 and the second quarter of 1999 shows that they resulted from mark-to-market positions booked after 1995. In other words, they were brought into the bank on the watch of the management team assembled after Sanford's retirement. Thus, the ultimate responsibility for these losses must rest with this new management team.

The second issue to investigate is one of cause. These losses were scattered across multiple business lines and diverse geographic regions. Large components of these losses were associated with derivatives transactions in Indonesia, Thailand, and Latin America. In addition, sizable losses were reported in Russian fixed-income securities, equity derivatives transactions in the United States, and leveraged lending in the United States and Europe.

The apparent diversity of the losses sustained by Bankers Trust points out an important aspect of risk management that some people have suggested is at least a partial explanation for the losses incurred by the firm. According to this argument, risk management offers the potential

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Bankers Trust's leveraged lending business. Alex. Brown expressed interest in being acquired by Bankers Trust, but the final negotiations had to be delayed until the regulatory rules allowed commercial banks to have such a large presence in the securities industry.

<sup>63</sup> "BT Rocks Wall St with \$791m Loss," *The Sydney Morning Herald*, October 24, 1998, p. 97.

for risk reduction; it does not offer the potential for risk elimination. Furthermore, analytical models are valuable because they enable us to isolate what appear to be the most important variables and relationships relevant to a specific problem and to focus our attention on these factors alone. But models are abstractions of reality with real limitations requiring that they be used with caution. The limitations of models arise from our incomplete understanding of financial markets, the relative paucity of data for analyzing financial markets, and, finally, the fact that key variables and relationships can change over time.

From this reasoning, the losses incurred by Bankers Trust might be explained as a long-tail event or an out-of-sample experience. Public statements issued by Bankers Trust's managers at the time portrayed markets in the second half of 1998-99 as "the perfect storm." Exposures that heretofore had shown little or no correlation appeared to move in lock-step, exposing concentrations that had not been anticipated. It is noteworthy that the sizes of these concentrations were most surprising in emerging markets, high-yield fixed-income positions, and leveraged lending.

While this argument cannot be dismissed, the second half of 1998 and 1999 did not present a meltdown scenario for the global financial services industry. It is true that Long-Term Capital Management was taken over in a bailout organized by the Federal Reserve in September 1998 and many other major financial institutions reported losses, but these losses were not on the same scale of Bankers Trust's losses. As described in the cover story in *USA Today* on October 23, 1998, "If Wall Street needs a poster child for everything that can go wrong in a financial crisis, it doesn't have to look much further than Bankers Trust."<sup>64</sup>

Another possibility is that the losses incurred by Bankers Trust in the second half of 1998 and 1999 were the result of historical events or problems that arose from the culture of the firm. This argument attempts to look beyond the specific transactions that resulted in losses in 1998-99 and find evidence of factors that in some way might have contributed to, or increased the probability of, severe losses at some future date. Although largely subjective, these arguments deserve consideration.

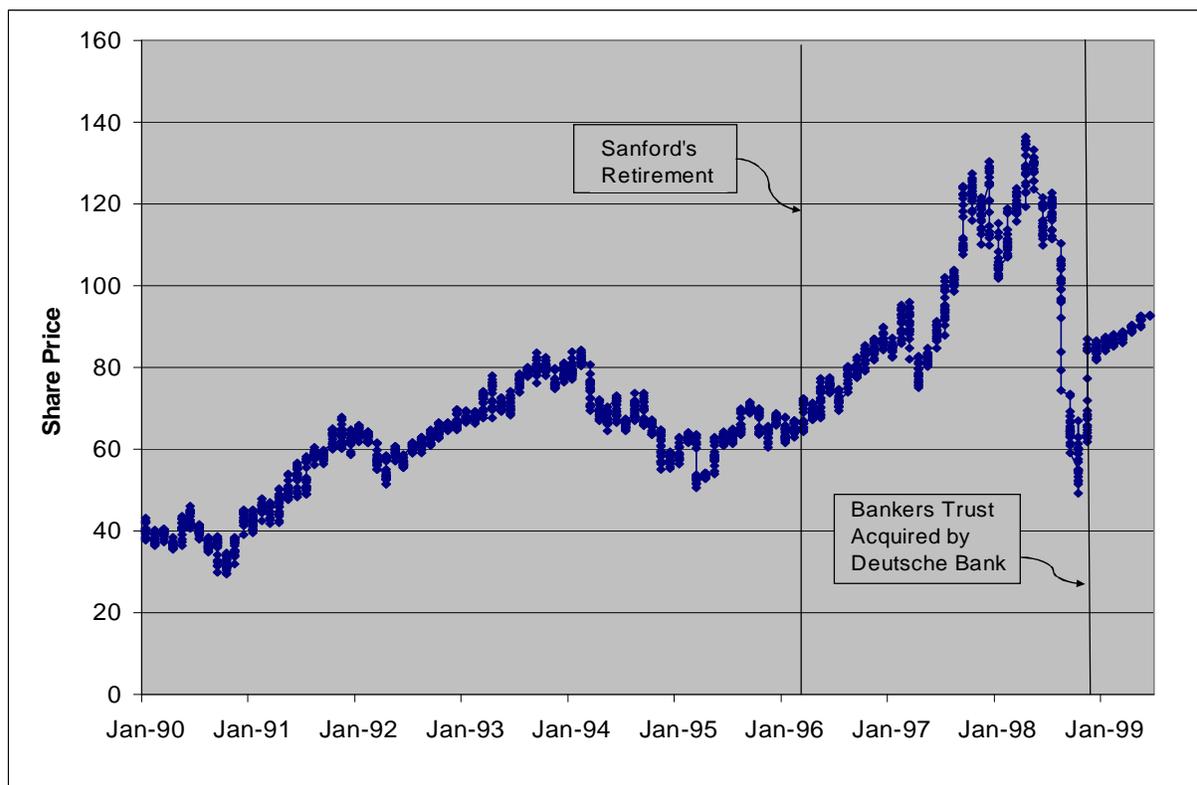
As described earlier, Bankers Trust incurred reputation risk in 1995-96 as a result of transactions undertaken in its leveraged derivatives business. An 18-month investigation of this business unit by an independent counsel failed to uncover deep-seated problems with the firm's execution of its responsibilities and noted that Bankers Trust placed a high premium on customer service and ethical business dealings. Although the firm's financial performance suffered as a result of these events, it recovered in the second half of 1995, and the firm went on to complete three significant acquisitions with regulatory approval in 1996-98.<sup>65</sup> In July 1998, Bankers Trust was selected by *Euromoney* as the Best Derivatives House and Best Risk Advisor.

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<sup>64</sup> "Bankers Trust \$488 Million Loss Shows Wall Street's Vulnerability," *USA Today*, October 23, 1998, p. 1.

<sup>65</sup> These acquisitions were Wolfensohn & Company (1996), Alex. Brown, Inc. (1997), and NatWest Markets' Pan-European cash equities business (1998).

Figure 3: Bankers Trust's Share Price, January 1, 1990 to June 3, 1999



Source: Bloomberg

The most credible explanation for the losses incurred by Bankers Trust in 1998-99 and the eventual sale of the firm appears to be a change in strategy—or, more precisely, a change in the discipline with which RAROC was applied within the firm. This change does not appear to have been an abrupt break with earlier practices—instead it was gradual tilting of the firm's business model. In spite of the acquisitions made in 1996 and 1997 to enhance the firm's investment banking capabilities, changes in Bankers Trust's strategy tended to move the firm back toward the norms and status quo of traditional commercial banking.<sup>66</sup>

- Less attention was given to risk and more attention was given to revenue.
- More attention was given to short-term performance targets with large pay-outs for top executives.<sup>67</sup>
- More reliance was given to historical cost accounting and less reliance was given to fair value accounting.

Gradually, the loan portfolio started to increase as a percentage of total assets,<sup>68</sup> and exposures to high-risk, high-return counterparties began to grow. In a more benign environment, this change in strategy might have gone undetected for a longer period of time. In a less severe market dislocation, the losses that this strategy produced might have been smaller. But benign

<sup>66</sup> Following comments are based on interviews with former Bankers Trust employees.

<sup>67</sup> In early 1996, the new management team unveiled an incentive plan potentially worth \$200 million for approximately 40 key executives. The full value of the plan would be unlocked when Bankers Trust's share price hit \$100 per share. See Steve Klinkerman, "Upward Spiral: Frank Newman's Plan for Revitalizing Bankers Trust," *Banking Strategies*, September/October 1996, pp. 28-32.

<sup>68</sup> See Figure 2 on page 28.

economic environments do not last forever, and the market dislocation of 1998-99 laid bare the weaknesses of this strategy.

### VIII. RAROC and the legacy of the Sanford era at Bankers Trust

During the period 1987-95, Bankers Trust used RAROC to guide business decisions at all levels of the firm.

- At the *product* level, it was used to identify risks associated with products and ensure that these risks were properly managed.
- At the *transaction* level, it was used to identify transactions that generate returns sufficient to cover the cost of risk and meet a prescribed target rate of return.
- At the *department* level, it was used to identify areas of the bank that generated high risk-adjusted returns and should be encouraged to grow, as distinct from those areas that did not generate sufficient risk-adjusted returns and should be down-sized or exited.
- At the *firm* level, it was used to ensure capital adequacy and to serve as an operational proxy for maximizing the return on shareholders' investments.

Above all, RAROC was an offensive tool used by Sanford to manage the long-term growth and evolution of the bank. In Sanford's mind, the CEO "owned" the capital of the bank in the sense that the CEO is ultimately responsible for the safety and return generated with shareholders' capital. One of the most important responsibilities of the CEO is to make capital available to the business units for value-creating activities. Any business unit that thought it could earn a rate of return equal to or in excess of the prescribed target could request additional capital, but it was held accountable for its performance. Any business that did not think it could earn a rate of return at least equal to the prescribed target was expected to return some or all of its capital to the CEO. The CEO would then allocate the capital to other business units or return it to the shareholders.<sup>69</sup>

The success of Bankers Trust's transformation is evident in analysts' reports, industry rankings, and its reported financial performance.

- In 1988, Salomon Brothers ranked Bankers Trust number one among 35 of the largest U.S. bank holding companies. This ranking was the composite result of some 70-odd performance measures that included profitability, liquidity, productivity, and efficiency.<sup>70</sup>
- In 1989, Salomon Brothers referred to Bankers Trust as "the most sophisticated U.S. merchant bank," stating, "We believe that Bankers Trust epitomizes the dedication to merchant banking that its peers and competitors will have to strive to attain during the 1990s in an ever more competitive banking environment."<sup>71</sup>
- In 1991, the *International Financial Review* named Bankers Trust "Bank of the Year," citing its evolution from a "mediocre commercial bank into a highly sophisticated, highly profitable, global trading and derivatives powerhouse."<sup>72</sup>

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<sup>69</sup> The opportunity for business units to return capital to the CEO was an attractive option for both the business units and for the bank, especially in the final months of a fiscal year. If a business unit could not use its allocated capital in transactions that met the prescribed RAROC target, it could return the capital and its annual performance would be evaluated on the reduced capital figure. For the bank, this practice discouraged business units from tying up capital in low-RAROC activities, provided additional capital for higher-return activities, and increased the liquidity of the bank's capital.

<sup>70</sup> Salomon Brothers Stock Research, *A Review of Stock Performance, 1989*.

<sup>71</sup> Thomas Hanley, John D. Leonard, Dianne B. Glossman and Dina I. Oddis, Salomon Brothers, Stock Research, *Bankers Trust New York Corporation: The Most Sophisticated U.S. Merchant Bank, August 1989*.

<sup>72</sup> "Review of the Year," *International Financial Review*, December 1991, p. 34.

- In February 1994, Brown Brothers Harriman published a company update on Bankers Trust that stated, “Despite their having out-performed the market in 1993 and thus far in 1994, we continue to regard Bankers Trust’s shares as a strong Buy. Our *Banking Outlook* of September 29, 1993 spotlighted three ‘Engines of Growth’ which we believe are likely to power the most successful financial services of the 1990s: risk management and derivatives products; corporate finance in the emerging markets of Asia and Latin America; and investment management for the assets of the baby boom generation. In addition, we identified a ‘negative’ engine, the business of commercial lending. Bankers Trust identified all four ‘engines’ years ago and, so far at least, appears to have gotten all of them right.”<sup>73</sup>

Bankers Trust’s overall financial performance from 1966 to 1999 is presented in the table below. During the 1966-78 period, the firm was predominantly a commercial bank. It adhered to a “buy and hold” lending strategy and followed the industry through the boom-and-bust cycle of real estate lending. During the 1966-74 period, Bankers Trust reported an average after-tax return on equity (ROE) of 10.9%. Between 1975 and 1978, its performance slumped to an average ROE of 8.4%, due largely to the write-offs associated with loans to real estate investment trusts. It was during this period that the RAROC model was developed and first implemented in the Resources Management department.

Once these real estate losses were behind it, the firm’s ROE improved, averaging 15.4% for the period 1979-86. During this period the RAROC model was fully implemented in Resources Management, and the department’s contributions to the bank’s earnings profile increased significantly, as reflected in the ratio of noninterest income to net interest income, which grew from 0.37 in 1978 to 1.12 in 1986. RAROC was first introduced outside of the Resources Management department in 1983, and by 1986 it had been applied to all business units in Bankers Trust.

From 1987 to the mid-1990s, Bankers Trust was guided by a strategy of risk management, product innovation, the productive deployment of capital, and the development of new markets. Following the discipline imposed by this strategy, the firm avoided the significant losses that plagued competitors during the energy price bust of 1986 and the real estate bust of 1991-92. More importantly, Bankers Trust used this strategy offensively to transform itself into a well-capitalized, highly profitable wholesale financial institution.

The reported figures for 1982-87 mask the sizeable lending exposures to less developed countries (LDCs) that were distressed but carried at par. These LDC loan losses were eventually recognized in 1987 and 1989, and total charge-offs of \$2.234 billion were recorded. Excluding the LDC write-offs, Bankers Trust consistently reported after-tax ROE figures in excess of 20% in the period 1987-93. During this time RAROC was followed in all departments of Bankers Trust. The firm’s performance declined with the problems that arose from its leveraged derivatives business and losses in Latin America in 1994-95. It recovered in 1996-97, but when the discipline of risk management was relaxed, it again stumbled, incurred significant losses, and eventually lost its independence.

The timing of the recognition of the LDC loan losses is important in relating Bankers Trust’s financial performance to the development and implementation of its risk management strategy. The LDC loan losses were large, and they wiped out the cumulative earnings of multiple

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<sup>73</sup> Raphael Soifer, Brown Brothers Harriman & Co., *Company Update: Bankers Trust*, February 28, 1994, p. 1.

years.<sup>74</sup> Furthermore, these loans were booked before August 1982, but the charge-offs were not recognized until 1987 and 1989. Since the LDC loans had been originated by the International Credit Group (of the International department), which did not report to Sanford nor did it accept the risk management discipline of RAROC at that time, the losses that resulted from these loans should be considered in the context of the period before 1982 and not in 1987 and 1989 when they were formally recognized.

Table 1: Bankers Trust's Financial Performance, 1966-99

Year	Net Income (after-tax, in millions)	Return on Equity (%)	Year	Net Income (after-tax, in millions) <sup>3</sup>	Charge-Offs for LDC Loans (in millions)	Return on Equity (%) <sup>3</sup>	Return on Equity - Excl Charge-Offs for LDC Loans (%)
1966	30.3	7.71 <sup>1</sup>	1983	261.2	0	14.59	
1967	43.2	10.62 <sup>1</sup>	1984	306.8	0	15.70	
1968	41.0	9.61 <sup>1</sup>	1985	371.2	0	15.83	
1969	41.0	9.31 <sup>1</sup>	1986	427.9	0	15.73	
1970	55.5	12.26 <sup>1</sup>	1987	1.2	636.0	0.00	21.05
1971	52.0	10.98 <sup>1</sup>	1988	647.7	0	20.27	
1972	67.6	13.57 <sup>1</sup>	1989	-979.9	1600.0	N/M	25.99
1973	60.6	11.48 <sup>1</sup>	1990	665.0	0	26.74	
1974	70.7	12.26 <sup>1</sup>	1991	667.0	0	23.10	
1975	63.2	8.94 <sup>1</sup>	1992	761.0	0	23.10	
1976	56.5	7.80 <sup>1</sup>	1993	995.0	0	26.33	
1977	61.3	7.47 <sup>1</sup>	1994	615.0	0	13.38	
1978	81.8	9.56 <sup>1</sup>	1995	215.0	0	3.98	
1979	113.7	12.78 <sup>2</sup>	1996	612.0	0	12.90	
1980	213.8	17.26 <sup>2</sup>	1997	866.0	0	15.60	
1981	188.0	15.52 <sup>2</sup>	1998	-73.0	0	N/M	
1982	239.0	15.78 <sup>2</sup>	1999 (Q2)	-1948.0	0	N/M	

<sup>1</sup> Calculated from reported Net Income and Shareholder's Equity  
<sup>2</sup> As reported, including redeemable preferred shares  
<sup>3</sup> As reported

Source: *Bankers Trust Annual Reports, by year*

Again, excluding the LDC loan losses reported in 1987 and 1989 and focusing on the 1987-95 era in which Sanford served as chairman and CEO—the time in which the bank was guided by RAROC and strategic risk management—Bankers Trust posted an average after-tax return on equity of 20.4%. This result is impressive for any firm and especially so in view of the weak 1995 performance that pulled down this average. In his letter to the firm's shareholders in 1995 annual report, Sanford wrote:

*Since 1985, the cumulative return to Bankers Trust shareholders, with dividends reinvested, has exceeded that of our peer group each year until the past year. . . .*

<sup>74</sup> Bankers Trust's charge-offs for LDC loans exceeded the total cumulative earnings recorded from 1978 to 1986.

*despite the fact that our 1995 return on equity fell below that of our peers and pulled down our average performance, we still ranked third among our peers over the past 10 years and ahead of our non-investment-banking competitors.*<sup>75</sup>

But the legacy of the Sanford era at Bankers Trust extends beyond the firm's successful transformation into merchant banking and its overall financial performance. More than any other single institution, Bankers Trust defined the new business model of modern banking. This new business model recognized banking as a competitive business operating in free markets, rather than a protected industry, or quasi-utility, exposed to limited competition.

Bankers Trust recognized the role of risk in understanding the true economics of the market. It pioneered the development and implementation of objective, analytical tools that enabled it to learn from the market, to adapt to the market, and to deliver market solutions to its customers. These capabilities were embodied in a strategy of risk and capital management that guided business decisions at all levels of the firm.

Following the discipline of RAROC, Bankers Trust rethought the basic model of commercial banking and built a different kind of bank—a bank that was aligned to the true economics of the market rather than a bank that held to the status quo or followed the business practices of peer institutions.

Equally important, Bankers Trust recognized the need to manage internal risks as well as external risks. It established

- the product control function to provide independent verification of transaction pricing;
- the model validation function to provide independent verification of model specification and calibration for reporting prices and risk; and
- the new product approval process to ensure that new products were properly understood within the firm and could be accurately priced, booked, risk managed, and reported before they were offered to customers.

Finally, the economic capital methodologies first developed at Bankers Trust are the cornerstone of capital regulations in the international banking community.

Although this new model of banking first emerged at Bankers Trust, the forces that shaped the development of this model were not unique to Bankers Trust but germane to markets in general. This new model of banking was created by the dynamic interplay of forces unleashed by a more volatile economic environment, deregulation, globalization, technological change, and new product development. But it was Bankers Trust that first recognized:

- 1) the inherent risks in markets;
- 2) the need to manage both return and risk;
- 3) the old “buy and hold” paradigm (the commercial banker as the intermediary who collects deposits, provides loans, and holds loans on its balance sheet) as a declining business;
- 4) the need to remove regulatory restrictions to permit a more competitive market for financial services; and
- 5) the need to adapt business strategies and activities to the market and not to the status quo or the industry norm.

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<sup>75</sup> All firms in the peer group were normalized for LDC loan losses. The peer group considered in this analysis included Morgan Stanley, Bear Stearns, J.P. Morgan, Merrill Lynch, Citicorp, Chase, Salomon Brothers, and Paine Weber. See Bankers Trust 1995 Annual Report, pp. 3-5.

And, most important, Bankers Trust had the will and the drive to address these issues.

Today, the risk management methodologies and tools created and implemented at Bankers Trust in the period from the mid-1970s to the mid-1990s are used around the world. As noted by John Drzik, president of Oliver Wyman and a leading consultant in the risk management field, "All major banks today use some variant of RAROC and economic capital models in their business. No bank that has adopted RAROC and economic capital practices have ever dismantled them." The same risk management methodologies have been adopted by regulators of financial institutions and are used globally in restraining risk at individual institutions and in limiting overall systemic risk in the financial institutions sector. Increasingly, these methodologies and tools are being incorporated into the management practices of leading industrial firms. And these methodologies have been and continue to be important building blocks for new products and drivers of market growth and liquidity.

As innovators and practitioners have often noted over the years, "We see as far as we do because we stand on the shoulders of giants." Bankers Trust during the period from the mid-1970s to the mid-1990s was a giant in the field of modern finance.



## Epilogue

Shortly after completing this paper, rising default rates in U.S. sub-prime mortgages triggered massive losses in structured credit products and rapidly destabilized financial markets around the world. The liquidity that had fueled the growth of credit markets over the previous decade soon evaporated, inter-bank lending froze, and valuations in credit markets plummeted. Since the onset of this crisis

- write-offs at major financial institutions have exceeded \$800 billion,
- some of the world's most venerable financial institutions have succumbed to bankruptcy, been nationalized, or accepted arranged acquisitions, and
- the U.S. and other developed market economies have tumbled into a recession that threatens to be in the most severe and the most prolonged since the Great Depression.

While there is widespread recognition of the key factors that contributed to this crisis, the broad scope of these factors and the manner in which they facilitated the cumulative build up of risks throughout the financial system will be the subject of ongoing discussions and debate. Of particular relevance for this paper, however, is the question of whether the current financial crisis reveals risk management to be broken or fundamentally inadequate.

The practice of modern risk management, as originally developed at Bankers Trust, was a combination of logic, intuition, and judgment.<sup>76</sup> The logic of risk management was expressed in mathematics and coded into models, but the intuition and judgment of risk management were recognized as personal characteristics of business managers that were encouraged and rewarded by the firm's culture.

The individual who formulated the earliest risk management models and championed risk management practices at Bankers Trust rose to become chairman and CEO of the firm.<sup>77</sup> As his responsibilities grew, so did the importance of risk management and the discipline of evaluating business activities with considerations for both return and risk.

Throughout its fifteen year transformation from a struggling full-service bank into a dynamic, well-capitalized wholesale financial institution, risk management was a guiding principle at Bankers Trust. At the end of this transformation—the late 1980s, Bankers Trust was more profitable than any of its rivals. Competitors were known both to marvel and bristle at the success of Bankers Trust, but few attempted to follow in its footsteps. Executives from other institutions were known to say, “RAROC appears to work for Bankers Trust, but it would never work in my firm.”

Starting in 1988 many of the analytical features of Bankers Trust's risk management models were codified into the Basel Accord.<sup>78</sup> The speed with which the banking industry subsequently

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<sup>76</sup> See Charles Sanford, Jr. and Dan Borge, “The Risk Management Revolution,” delivered at The Legacy of Norbert Wiener: A Centennial Symposium, cosponsored by the American Mathematical Society and the Massachusetts Institute of Technology, October 13, 1994.

<sup>77</sup> Charles Sanford pioneered the first modern risk management models in the mid 1970s while he was head of the Resources Management department. In 1983 he was promoted to president of the firm, and in 1987 he was elected chairman and CEO.

<sup>78</sup> The initial version of the Accord accepted the concept of “risk capital” but ignored many of the risk management concepts that were in use at Bankers Trust at that time. For example, the initial accord ignored market risk and failed to distinguish the risk of different obligors in assessing credit risk. Market risk was incorporated into the Accord in January 1996. In 1999, differentiated risk factors for the determination of credit risk were introduced as part of Basel II.

embraced risk management practices all but eclipsed the motivations and identity of the early pioneers. When J.P. Morgan distributed its value-at-risk (VaR) model to the public in 1993, this model was accepted with open arms by peer institutions, in part, because it enabled them to address a regulatory requirement. Addressing a regulatory requirement is a far easier task than changing the business model and risk management culture of a firm.

This brief synopsis suggests several possible explanations of why the risk management practices may appear broken or inadequate in light of the current financial crisis. First, models are building blocs to help users develop their thoughts and communicate their ideas. The construction of a model starts with the identification of variables thought to be most relevant for understanding a specific problem. These simplifications of the real world are valuable tools when combined with seasoned judgment and used to inform and constrain that judgment.<sup>79</sup> One of the biggest dangers with models is that users may cease to challenge them by failing to question their assumptions, their parameters, and their specifications. Over time, variables and relationships that were originally thought to be insignificant or simply ignored may become highly significant and the model itself may produce misleading results.

In the thirteen years between 1993 and 2005, all major financial institutions adopted some form of risk management and economic capital models in their business practices.<sup>80</sup> In most of these cases, the practice of risk management never developed beyond a regulatory requirement, a ticket for doing business, and an industry standard to be followed. Only in a few cases were these models combined with intuition, judgment, and management discipline to change the behavior and culture of the firm. In the end, regulators cannot impose successful risk management practices any more effectively than they can impose successful business strategies. In the end, effective risk management practices must originate within a firm.

Second, the ultimate risk manager of a firm is the CEO. Although the CEO may assign the title chief risk officer to a subordinate and delegate specific risk management tasks, he cannot delegate the ultimate responsibility for managing risk anymore than he can delegate the ultimate responsibility for managing return. Only the CEO has the perspective and the authority to serve as a strategic portfolio manager in allocating the firm's capital, and only the CEO can ensure corporate discipline around a core strategy and a core set of values.<sup>81</sup>

Third, the truly hard task in risk management is challenging the behavior of employees and the culture of a firm to be smarter about taking and holding risks. In the late 1970s Bankers Trust did not have the luxury of clinging to a "business as usual" strategy. Loan losses and weak competitive positions in key markets forced the firm to re-define its business model and focus on a core, unifying strategy. This break-with-the-past created opportunities for new ideas and new talent to rise within the bank. Over time, the passion to understand and assess risk became a cornerstone in its new business model. Bankers Trust prided itself in "challenging the status quo" and re-inventing itself to protect its competitive position.

In the years leading up to the current crisis, credit markets were awash in liquidity. Investor demand seemed insatiable, and nominal profits in the financial services industry achieved all-time highs. CEOs of several major institutions were quoted as encouraging their business units to take more risk, not less. Implicitly they assumed risk would remain benign. Confident of their

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<sup>79</sup> David M. Rowe, "The Role of models in Economic Prediction," presented at the 24th Annual Meeting of the National Association of Business Economists, September 22, 1982.

<sup>80</sup> Interview with John Drzik, president of Oliver, Wyman and Co.

<sup>81</sup> See Sanford and Borge, *op. cit.*, p. 10.

“business as usual” strategy, most CEOs and most senior managers did not seek to advance their risk management practices. The results of this strategy are evident in today’s financial crisis.

This crisis, no matter how severe or how prolonged it appears today, will eventually pass. The questions that arise most forcefully today do not relate to alternatives to market economies, but to the stability and limits of market economies. A critical aspect of risk management is about learning from markets. Models alone will never be sufficient for this task. Since markets are constantly changing and adapting, risk managers must be ever vigilant to identify new sources of risk and ever mindful of the unwitting accumulation of more familiar risks.

If the current crisis suggests that risk management is broken or inadequate, it is not because the models are flawed. The results of models should always be viewed as indicative and not conclusive. Models are meant to be part of a learning process that includes intuition, judgment, and discipline. The argument can be made that the application of mathematics and statistics to finance has added logic and structure to our investigations and contributed to the dynamism and creativity of financial markets.

The shortcomings and failures that preceded the current financial crisis were failures of business judgment and strategy. The issues that must be addressed to promote more effective risk management and, in the end, greater stability in financial markets are corporate governance, compensation policy, regulatory oversight, and accounting transparency. The greatest challenge in addressing these issues will be to restore confidence to financial markets without sacrificing innovation and creativity.

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## About the author

Gene D. Guill is a managing director in the Loan Exposure Management Group of Deutsche Bank. Based in New York, Dr. Guill is responsible for the valuation and risk management models and practices deployed in managing Deutsche Bank's international large corporate and European mid-cap loan portfolios.

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Dr. Guill has served as chairman (2002-05), vice-chairman (2001-02), and member of the board of directors (2001-06) of the International Association of Credit Portfolio Managers; president (1999-2000) and member of the board of directors (1997-2001) of the New York Chapter of the Risk Management Association; and a member of the editorial advisory board of *The RMA Journal* (1995-2006). He is a member of the board of directors of BELL: Building Educated Leaders for Life (2007 to present), a member of the editorial board of the *Journal of Applied Finance* (2007 to present), and a charter member of *Risk Who's Who*. He holds a B.A. from Davidson College and a Ph.D. in economics from Duke University.