CHAPTER 28

Risk Management Mistakes to Avoid

Since the mid-1980s, there have been some spectacular losses in financial markets. This chapter explores the lessons we can learn from them and reviews key points made in earlier chapters. The losses that we will consider are listed in Business Snapshot 28.1.

One remarkable aspect of the list in Business Snapshot 28.1 is the number of times huge losses were caused by the activities of a single person. In 1995, Nick Leeson's trading brought a 200-year-old British bank, Barings, to its knees; in 1994, Robert Citron's trading led to Orange County, a municipality in California, losing about $2 billion. Joseph Jett's trading for Kidder Peabody caused losses of $350 million. John Rusnak's losses of $700 million at Allied Irish Bank came to light in 2002. Jérôme Kerviel lost over $7 billion for Société Générale in 2008. Kweku Adoboli lost $2.3 billion for UBS in 2011.

A key lesson from the losses is the importance of internal controls. Many of the losses we will consider occurred because systems were inadequate so that the risky positions being taken were simply not known. It is also important for risk managers to continually "think outside the box" about what could go wrong so that as many potential adverse events as possible are identified.

28.1 RISK LIMITS

The first and most important lesson from the losses concerns risk limits. It is essential that all companies (financial and nonfinancial) define in a clear and unambiguous way limits to the financial risks that can be taken. They should then set up procedures for ensuring that the limits are adhered to. Ideally, overall risk limits should be set at board level. These should then be converted to limits applicable to the individuals responsible for managing particular risks. Daily reports should indicate the gain or loss that will be experienced for particular movements in market variables. These should be checked against the actual gains and losses that are experienced to ensure that the valuation procedures underlying the reports are accurate.

It is particularly important that companies monitor risks carefully when derivatives are used. This is because derivatives can be used for hedging or speculation or arbitrage. Without close monitoring, it is impossible to know whether a derivatives trader has switched from being a hedger to a speculator or switched from being an

BUSINESS SNAPSHOT 28.1

Big Losses

Allied Irish Bank: This bank lost about $700 million from the unauthorized speculative activities of one of its foreign exchange traders, John Rusnak, which lasted a number of years. Rusnak covered up his losses by creating fictitious options trades.

Barings: This 200-year-old British bank was wiped out in 1995 by the activities of one trader, Nick Leeson, in Singapore. The trader's mandate was to arbitrage between Nikkei 225 futures quotes in Singapore and Osaka. Instead he made big bets on the future direction of the Nikkei 225 using futures and options. The total loss was close to $1 billion.

Enron's Counterparties: Enron managed to conceal its true situation from its shareholders with some creative contracts. Several financial institutions that allegedly helped Enron do this have each had to settle shareholder lawsuits for over $1 billion.

Hammersmith and Fulham (see Business Snapshot 23.1): This British Local Authority lost about $600 million on sterling interest rate swaps and options in 1988. The two traders responsible for the loss knew surprisingly little about the products they were trading.

Kidder Peabody (see Business Snapshot 25.1): The activities of a single trader, Joseph Jett, led to this New York investment dealer losing $350 million trading U.S. government securities. The loss arose because of a mistake in the way the company's computer system calculated profits.

Long-Term Capital Management (see Business Snapshot 22.1): This hedge fund lost about $4 billion in 1998 carrying out convergence arbitrage strategies. The loss was caused by a flight to quality after Russia defaulted on its debt.

National Westminster Bank: This British bank lost about $130 million from using an inappropriate model to value swap options in 1997.

Orange County (see Appendix B): The activities of the treasurer, Robert Citron, led to this California municipality losing about $2 billion in 1994. The treasurer was using derivatives to speculate that interest rates would not rise.

Procter & Gamble (see Business Snapshot 5.4): The treasury department of this large U.S. company lost about $90 million in 1994 trading highly exotic interest rate derivatives contracts with Bankers Trust. It later sued Bankers Trust and settled out of court.

Société Générale (see Business Snapshot 5.5): Jérôme Kerviel, an equity trader in the Paris office, lost over $7 billion speculating on movements in equity indices in January 2008. He is alleged to have concealed his exposure by creating fictitious trades. Like Leeson at Barings, his mandate was to do arbitrage trades.

Subprime Mortgage Losses (see Chapter 6): In 2007, investors lost confidence in the structured products created from U.S. subprime mortgages. This led to a "credit crunch" with losses of tens of billions of dollars by financial institutions and the worst recession since the 1930s.

UBS: In 2011, Kweku Adoboli lost $2.3 billion taking unauthorized speculative positions in stock market indices.

arbitrageur to being a speculator. The Barings, Société Générale, and UBS losses are classic examples of what can go wrong. In each case, the trader's mandate was to carry out low-risk arbitrage and hedging. Unknown to their superiors, they switched from being arbitrageurs and hedgers to taking huge bets on the future direction of market variables. The systems within the banks were inadequate and did not detect what was going on.

The argument here is not that no risks should be taken. A trader in a financial institution or a fund manager should be allowed to take positions on the future direction of relevant market variables. What we are arguing is that the sizes of the positions that can be taken should be limited and the systems in place should accurately report the risks being taken.

A Difficult Situation

What happens if an individual exceeds risk limits and makes a profit? This is a tricky issue for senior management. It is tempting to ignore violations of risk limits when profits result. However, this is shortsighted. It leads to a culture where risk limits are not taken seriously, and it paves the way for a disaster. The classic example here is Orange County. Robert Citron's activities in 1991–1993 had been very profitable for Orange County, and the municipality had come to rely on his trading for additional funding. People chose to ignore the risks he was taking because he had produced profits. Unfortunately, the losses made in 1994 far exceeded the profits from previous years.

The penalties for exceeding risk limits should be just as great when profits result as when losses result. Otherwise, traders who make losses are liable to keep increasing their bets in the hope that eventually a profit will result and all will be forgiven.

Do Not Assume You Can Outguess the Market

Some traders are quite possibly better than others. But no trader gets it right all the time. A trader who correctly predicts the direction in which market variables will move 60% of the time is doing well. If a trader has an outstanding track record (as Robert Citron did in the early 1990s), it is likely to be a result of luck rather than superior trading skill. As our discussion of mutual fund performance in Chapter 4 shows, it appears that fund managers usually produce superior returns as a result of luck rather than skill.

Suppose that a financial institution employs 16 traders and one of those traders makes profits in every quarter of a year. Should the trader receive a good bonus? Should the trader's risk limits be increased? The answer to the first question is that the trader will inevitably receive a good bonus. The answer to the second question should be no. The chance of making a profit in four consecutive quarters from random trading is 0.5^4 or 1 in 16. This means that just by chance one of the 16 traders will "get it right" every single quarter of the year. We should not assume that the trader's luck will continue and we should not increase the trader's risk limits.

Do Not Underestimate the Benefits of Diversification

When a trader appears good at predicting a particular market variable, there is a tendency to increase the trader's risk limits. We have just argued that this is a bad idea because it is quite likely that the trader has been lucky rather than clever. However, let us suppose that we are really convinced that the trader has special talents. How undiversified should we allow ourselves to become in order to take advantage of the trader's special skills? As indicated in Section 1.1, the benefits from diversification are large. A trader has to be very good for it to be worth foregoing these benefits to speculate heavily on just one market variable.

An example will illustrate the point here. Suppose that there are 20 stocks, each of which has an expected return of 10% per annum and a standard deviation of return of 30%. The correlation between the returns from any two of the stocks is 0.2. By dividing an investment equally among the 20 stocks, an investor has an expected return of 10% per annum and standard deviation of returns of 14.7%. Diversification enables the investor to reduce risks by over half. Another way of expressing this is that diversification enables an investor to double the expected return per unit of risk taken. The investor would have to be very good at stock picking to consistently get a better risk-return trade-off by choosing undiversified stock portfolios.

Carry Out Scenario Analyses and Stress Tests

As discussed in Chapter 22, the calculation of risk measures such as VaR should always be accompanied by scenario analyses and stress testing to obtain an understanding of what can go wrong. Without the discipline of stress testing, human beings have an unfortunate tendency to anchor on one or two scenarios when evaluating decisions. In 1993 and 1994, for example, Procter & Gamble was so convinced that interest rates would remain low that it ignored the possibility of a 100-basis-point increase in its decision making.

Once stress-testing results have been produced, they should become inputs to a financial institution's strategic decision making. All too often, particularly when times are good, the results of stress testing are ignored. This happened at a number of financial institutions prior to July 2007.

28.2 MANAGING THE TRADING ROOM

In trading rooms there is a tendency to regard high-performing traders as "untouchable" and to not subject their activities to the same scrutiny as other traders. Apparently Joseph Jett, Kidder Peabody's star trader of Treasury instruments, was often "too busy" to answer questions and discuss his positions with the company's risk managers.

All traders—particularly those making high profits—should be fully accountable. It is important for the financial institution to know whether the high profits are being made by taking unreasonably high risks. It is also important to check that the financial institution's computer systems and pricing models are correct and are not being manipulated in some way.

Separate the Front, Middle, and Back Office

The *front office* in a financial institution consists of the traders who are executing trades, taking positions, and so on. The *middle office* consists of risk managers who are monitoring the risks being taken. The *back office* is where the record keeping and accounting takes place. Some of the worst derivatives disasters have occurred because these functions were not kept separate. Nick Leeson controlled both the front and back office for Barings in Singapore and was, as a result, able to conceal the disastrous nature of his trades from his superiors in London for some time.

Do Not Blindly Trust Models

We discussed model risk in Chapter 25. Some of the large losses experienced by financial institutions arose because of the models and computer systems being used. Kidder Peabody was misled by its own systems. Another example of an incorrect model leading to losses is provided by National Westminster Bank. This bank had an incorrect model for valuing swap options that led to a large loss.

If large profits are reported when relatively simple trading strategies are followed, there is a good chance that the models underlying the calculation of the profits are wrong. Similarly, if a financial institution appears to be particularly competitive on its quotes for a particular type of deal, there is a good chance that it is using a different model from other market participants—which almost certainly means that, before too long, it will have to change its model and report a loss. Getting too much business of a certain type can be just as worrisome to the head of a trading room as getting too little business of that type.

Be Conservative in Recognizing Inception Profits

When a financial institution sells a highly exotic instrument to a nonfinancial corporation, the valuation can be highly dependent on the underlying model. For example, instruments with long-dated embedded interest rate options can be highly dependent on the interest rate model used. In these circumstances, a phrase used to describe the daily marking to market of the deal is *marking to model*. This is because there are no market prices for similar deals that can be used as a benchmark.

Suppose that a financial institution manages to sell an instrument to a client for $10 million more than it is worth—or at least $10 million more than its model says it is worth. The $10 million is known as an *inception profit*. When should it be recognized? There appears to be a lot of variation in what different derivatives dealers do. Some recognize the $10 million immediately, whereas others are much more conservative and recognize it slowly over the life of the deal.

Recognizing inception profits immediately is very dangerous. It encourages traders to use aggressive models, take their bonuses, and leave before the model and the value of the deal come under close scrutiny. It is much better to take reserves and to recognize inception profits slowly, so that traders are motivated to investigate the impact of several different models and several different sets of assumptions before committing themselves to a deal.

Do Not Sell Clients Inappropriate Products

It is tempting to sell corporate clients inappropriate products, particularly when they appear to have an appetite for the underlying risks. But this is shortsighted. A dramatic illustration is provided by the activities of Bankers Trust (BT) in the period leading up to the spring of 1994. BT's clients, such as Procter & Gamble, were persuaded to buy high-risk and totally inappropriate products. A typical product would give a client a good chance of saving a few basis points on its borrowings and a small chance of losing a large amount of money. The products worked well for BT's clients in 1992 and 1993, but blew up in 1994 when interest rates rose sharply. The bad publicity that followed hurt BT greatly. The years it had spent building up trust among corporate clients and developing an enviable reputation for innovation in derivatives were largely lost as a result of the activities of a few overly aggressive salesmen. BT was forced to pay large amounts of money to its clients to settle lawsuits out of court. It was taken over by Deutsche Bank in 1999.

Beware of Easy Profits

Enron provides an example of how overly aggressive deal makers can cost their banks billions of dollars. Doing business with Enron seemed very profitable and banks competed with each other for this business. But the fact that many banks push hard to get a certain type of business should not be taken as an indication that the business will ultimately be profitable. The business that Enron did with banks resulted in many very expensive shareholder lawsuits. In general, transactions where high profits seem easy to achieve should be looked at closely for potential operational, credit, or market risks.

Investing in the AAA-rated tranches of ABSs and ABS CDOs that were created from subprime mortgages (see Chapter 6) seemed like a money-making machine for many banks. The promised returns were higher than the returns normally earned on AAA-rated instruments. Most traders did not stop to ask whether this was because there were risks that had not been taken into account by rating agencies.

28.3 LIQUIDITY RISK

We discussed liquidity risk in Chapter 24. Financial engineers usually base the pricing of exotic instruments and other instruments that trade relatively infrequently on the prices of actively traded instruments. For example:

1. A trader often calculates a zero curve from actively traded government bonds (known as on-the-run bonds) and uses it to price bonds that trade less frequently (off-the-run bonds).
2. A trader often implies the volatility of an asset from actively traded options and uses it to price less actively traded options.
3. A trader often implies information about the behavior of interest rates from actively traded interest rate caps and swap options and uses it to price products that are highly structured.

These practices are not unreasonable. However, it is dangerous to assume that less actively traded instruments can always be traded at close to their theoretical prices. When financial markets experience a shock of one sort or another, liquidity black holes may develop (see Section 24.3). Liquidity then becomes very important to investors, and illiquid instruments often sell at a big discount to their theoretical values.

An example of liquidity risk is provided by Long-Term Capital Management (LTCM), which is the subject of Business Snapshot 22.1. This hedge fund followed a strategy known as *convergence arbitrage*. It attempted to identify two securities (or portfolios of securities) that should in theory sell for the same price. If the market price of one security was less than that of the other, it would buy that security and sell the other. The strategy is based on the idea that if two securities have the same theoretical price, their market prices should eventually be the same.

In the summer of 1998, LTCM took a huge loss. This was largely because a default by Russia on its debt caused a flight to quality. LTCM tended to be long illiquid instruments and short the corresponding liquid instruments. (For example, it was long off-the-run bonds and short on-the-run bonds.) The spreads between the prices of illiquid instruments and the corresponding liquid instruments widened sharply after the Russian default. LTCM was highly leveraged. It experienced huge losses and there were margin calls on its positions that it had difficulty meeting.

The LTCM story reinforces the importance of carrying out scenario analyses and stress testing to look at what can happen in extreme scenarios. As discussed in Chapter 22, it is important to consider not only immediate losses but also losses created by knock-on effects.

Beware When Everyone Is Following the Same Trading Strategy

It sometimes happens that many market participants are following essentially the same trading strategy. This creates a dangerous environment where there are liable to be big market moves, liquidity black holes, and large losses for the market participants.

We gave one example of this in Business Snapshot 24.4, which discussed portfolio insurance and the market crash of October 1987. In the months leading up to the crash, increasing numbers of portfolio managers were attempting to insure their portfolios by creating synthetic put options. This involved buying stocks or stock index futures after a rise in the market and selling them after a fall. The result was an unstable market. A relatively small decline in stock prices could lead to a wave of selling by portfolio insurers. The latter would lead to a further decline in the market, which could give rise to another wave of selling, and so on. There is little doubt that, without portfolio insurance, the crash of October 1987 would have been much less severe.

Another example is provided again by LTCM in 1998. Its position was made more difficult by the fact that many other hedge funds were following similar convergence arbitrage strategies. After the Russian default and the flight to quality, LTCM tried to liquidate part of its portfolio to meet margin calls. Unfortunately, other hedge funds were facing similar problems to LTCM and trying to do similar trades. This exacerbated the situation, causing liquidity spreads to be even higher than they would otherwise have been and reinforcing the flight to quality. Consider, for

example, LTCM's position in U.S. Treasury bonds. It was long the illiquid off-the-run bonds and short the liquid on-the-run bonds. When a flight to quality caused spreads between yields on the two types of bonds to widen, LTCM had to liquidate its positions by selling off-the-run bonds and buying on-the-run bonds. Other large hedge funds were doing the same. As a result, the price of on-the-run bonds rose relative to off-the-run bonds and the spread between the two yields widened even more.

A further example is provided by British insurance companies in the late 1990s. This is discussed in Business Snapshot 3.1. All insurance companies decided to hedge their exposure to a fall in long-term rates at about the same time. The result was a fall in long-term rates!

The key lesson to be learned from these stories is that it is important to see the big picture of what is going on in financial markets and to understand the risks inherent in situations where many market participants are liable to follow the same trading strategy.

Do Not Make Excessive Use of Short-Term Funding for Long-Term Needs

All financial institutions finance long-term needs with short-term sources of funds to some extent. But a financial institution that relies too heavily on short-term funds is likely to expose itself to unacceptable liquidity risks.

During the period leading up to the credit crisis of 2007, there was a tendency for subprime mortgages and other long-term assets to be financed by commercial paper while they were in a portfolio waiting to be packaged into structured products. Conduits and special purpose vehicles had an ongoing requirement for this type of financing. The commercial paper would typically be rolled over every month. For example, the purchasers of commercial paper issued on April 1 would be redeemed with the proceeds of a new commercial paper issue on May 1; this new commercial paper issue would in turn be redeemed with another new commercial paper issue on June 1; and so on. When investors lost confidence in subprime mortgages in August 2007, it became impossible to roll over commercial paper. In many instances, banks had provided guarantees and had to provide financing. This led to a shortage of liquidity. As a result, the credit crisis was more severe than it would have been if longer-term financing had been arranged.

Many of the failures of financial institutions during the crisis (e.g., Lehman Brothers and Northern Rock) were caused by excessive reliance on short-term funding. Once the market (rightly or wrongly) becomes concerned about the health of a financial institution, it can be impossible to roll over the financial institution's short-term funding. The Basel Committee has recognized the importance of liquidity risks by introducing liquidity requirements in Basel III.

Market Transparency is Important

One of the lessons from the credit crisis of 2007 is that market transparency is important. During the period leading up to 2007, investors had been trading highly structured products without any real knowledge of the underlying assets. All they knew was the credit rating of the security being traded. With hindsight, we can say

that investors should have demanded more information about the underlying assets and should have more carefully assessed the risks they were taking.

The subprime meltdown of August 2007 caused investors to lose confidence in all structured products and withdraw from that market. This led to a market breakdown where tranches of structured products could only be sold at prices well below their theoretical values. There was a flight to quality and credit spreads increased. If there had been market transparency, so that investors understood the asset-backed securities they were buying, there would still have been subprime losses, but the flight to quality and disruptions to the market would have been less pronounced.

28.4 LESSONS FOR NONFINANCIAL CORPORATIONS

Here are some lessons applicable primarily to nonfinancial corporations.

Make Sure You Fully Understand the Trades You Are Doing

Corporations should never undertake a trade or a trading strategy that they do not fully understand. This is a somewhat obvious point, but it is surprising how often a trader working for a nonfinancial corporation will, after a big loss, admit to not really understanding what was going on and claim to have been misled by investment bankers. Robert Citron, the treasurer of Orange County did this. So did the traders working for Hammersmith and Fulham, who in spite of their huge positions were surprisingly uninformed about how the swaps and other interest rate derivatives they traded really worked.

If a senior manager in a corporation does not understand a trade proposed by a subordinate, the trade should not be approved. A simple rule of thumb is that if a trade and the rationale for entering into it are so complicated that it cannot be easily understood, it is almost certainly inappropriate for the corporation. The trades undertaken by Procter & Gamble would have been vetoed under this criterion.

One way of ensuring that you fully understand a financial instrument is to value it. If a corporation does not have the in-house capability to value an instrument, it should not trade it. In practice, corporations often rely on their investment bankers for valuation advice. This is dangerous, as Procter & Gamble found out. When it wanted to unwind its transactions, it found it was facing prices produced by Bankers Trust's proprietary models, which it had no way of checking.

Make Sure a Hedger Does Not Become a Speculator

One of the unfortunate facts of life is that hedging is relatively dull, whereas speculation is exciting. When a company hires a trader to manage foreign-exchange risk, commodity price risk, or interest rate risk, there is a danger that the following happens. At first the trader does the job diligently and earns the confidence of top management. He or she assesses the company's exposures and hedges them. As time goes by, the trader becomes convinced that he or she can outguess the market. Slowly the trader becomes a speculator. At first things go well, but then a loss is made. To recover the loss, the trader doubles up the bets. Further losses are made, and so on. The result is a disaster.

As mentioned earlier, clear limits to the risks that can be taken should be set by senior management. Controls should be put in place to ensure that the limits are obeyed. The trading strategy for a corporation should start with an analysis of the risks facing the corporation in foreign exchange, interest rate, and other markets. A decision should then be taken on how the risks are to be reduced to acceptable levels. It is a clear sign that something is wrong within a corporation if the trading strategy is not derived in a very direct way from the company's exposures.

Be Cautious about Making the Treasury Department a Profit Center

In the last 30 years, there has been a tendency to make the treasury department within a corporation a profit center. This seems to have much to recommend it. The treasurer is motivated to reduce financing costs and manage risks as profitably as possible. The problem is that the potential for the treasurer to make profits is limited. When raising funds and investing surplus cash, the treasurer is facing an efficient market. The treasurer can usually improve the bottom line only by taking additional risks. The company's hedging program gives the treasurer some scope for making shrewd decisions that increase profits. But it should be remembered that the goal of a hedging program is to reduce risks, not to increase expected profits. The decision to hedge will lead to a worse outcome than the decision not to hedge roughly 50% of the time. The danger of making the treasury department a profit center is that the treasurer is motivated to become a speculator. An Orange County or Procter & Gamble type of outcome is then liable to occur.

28.5 A FINAL POINT

Most of the risks we have considered in this book are what are termed *known risks*. They are risks such as market risks and credit risks that can be quantified using historical data. Two other types of risk are important to financial institutions: *unknown risks* and *unknowable risks*.

Unknown risks are risks where the event that could cause a loss is known, but its probability of occurrence cannot easily be determined. Operational risks and business risks include many different types of unknown risks. What is the probability of a rogue trader loss? What is the probability of a loss from a major lawsuit? What is the probability that operations in a particular country will be expropriated by the government? These probabilities cannot usually be estimated using historical data. As discussed in Chapter 22, subjective probabilities are often used. In a widely referenced book, Knight (1921) uses the term "risk" to refer to known risks and the term "uncertainty" to refer to unknown risks.[1]

Unknowable risks are risks where even the event that could cause a loss is not known. Unknowable risks are in many ways the most insidious because they come as a complete surprise and often lead to dramatic losses. An unknowable risk is sometimes referred to as a *black swan*. (Black swans were not considered possible

[1] See F. H. Knight, *Risk, Uncertainty and Profit* (Boston: Houghton Mifflin Company, 1921).

until they were discovered in Australia.) As pointed out by Taleb (2007), once it has occurred, a black swan event is often considered to be obvious.[2] Did the producers of multi-volume encyclopedias in 1970 consider the possibility that technological developments would render their product worthless? Probably not, but ex post it seems a fairly obvious risk.

How can companies manage unknown and unknowable risks? A key tool is flexibility. Companies should avoid excessive leverage and try to ensure that their costs are variable rather than fixed as far as possible. Diversification across products and markets also increases flexibility. In the future, insurance companies may well develop more products to handle unknown and unknowable risks. As discussed in Chapter 23, products have already been developed to provide protection against some operational (unknown) risks. Handling unknowable risk is a challenging (but not totally impossible) contract design problem.

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[2] See N. N. Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007).