

CHAPTER 1**Introduction to Operational Risk Management and Modeling**

Operational risk (OR) is everywhere in the business environment. It is the oldest risk facing banks and other financial institutions. Any financial institution will face operational risk long before it decides on its first market trade or credit transaction. Of all the different types of risk facing financial institutions, OR can be among the most devastating and the most difficult to anticipate. Its appearance can result in sudden and dramatic reductions in the value of a firm. The spectacular collapse of Barings in 1995, the terrorist attack on the World Trade Center in September 2001, the \$691 million in losses due to fraud reported by Allied Irish Bank in 2002, and the widespread electrical failure experienced by over 50 million people in the northeastern United States and Canada in August 2003 are all concrete but very different illustrations of operational risk. The rapid pace of technological change, removal of traditional trade barriers, expanding customer base through globalization and e-commerce, and mergers and consolidations have led to the perception that OR is increasing. Indeed, although many functions can be outsourced, OR cannot. Increasingly, banks and other financial institutions are establishing OR management functions at the senior executive level in an effort to better manage this class of risk. In this chapter we discuss the definition of OR, outline the regulatory background, and describe the role of statistical methods in measuring, monitoring, and assessing operational risk.

WHAT IS OPERATIONAL RISK?

There is no generally accepted definition of OR in the financial community. This lack of consensus relates to the fundamental nature of operational risk itself. Its scope is vast and includes a wide range of issues and problems that fall outside of market and credit risk. A useful starting point is to acknowledge that OR encompasses risk inherent in business activities across an

organization. This notion of OR is a broader concept than “operations” or back and middle office risk and affords differing definitions. For example, Jameson (1998) defines OR as “Every risk source that lies outside the areas covered by market risk and credit risk.”

Typically, this will include transaction-processing errors, systems failure, theft and fraud, “fat finger”¹ trades, lawsuits, and loss or damage to assets. Jameson’s definition is considered by many as too broad in the sense that it includes not only operational risk but business, strategy, and liquidity risks as well. An alternative provided by the British Bankers’ Association (1997) states, “The risks associated with human error, inadequate procedures and control, fraudulent and criminal activities; the risk caused by technological shortcomings, system breakdowns; all risks which are not ‘banking’ and arising from business decisions as competitive action, pricing, etc.; legal risk and risk to business relationships, failure to meet regulatory requirements or an adverse impact on the bank’s reputation; ‘external factors’ include: natural disasters, terrorist attacks and fraudulent activity, etc.”

Another frequently quoted definition of OR is that proposed by the Basel Committee on Banking Supervision (2001b): “The risk of loss resulting from inadequate or failed internal processes, people systems or from external events.” In this categorization OR includes transaction risk (associated with execution, booking, and settlement errors and operational control), process risk (policies, compliance, client and product, mistakes in modeling methodology, and other risks such as mark-to-market error), systems risk (risks associated with the failure of computer and telecommuni-

OTHER SOURCES OF RISK

There are three broad classifications of the risk facing financial institutions: operational risk, market risk, and credit risk. Market risk is the risk to a financial institution’s financial condition resulting from adverse movements in the level or volatility of interest rates, equities, commodities, and currencies. It is usually measured using value at risk (VaR). VaR is the potential gain or loss in the institution’s portfolio that is associated with a price movement of a given confidence level over a specified time horizon. For example, a bank with a 10-day VaR of \$100 million at a 95 percent confidence level will suffer a loss in excess of \$100 million in approximately one two-week period out of 20, and then only if it is unable to take any action to mitigate its loss. Credit risk is the risk that a counterparty will default on its obligation.

cation systems and programming errors), and people risk (internal fraud and unauthorized actions).

However we choose to define OR, our definition should allow it to be prudently and rigorously managed by capturing the business disruption, failure of controls, errors, omissions, and external events that are the consequence of operational risk events.

THE REGULATORY ENVIRONMENT

Traditionally, financial institutions have focused largely on market and credit risk management, with few if any resources devoted to the management of operational risks. The perception that operational risk has increased markedly over recent years, combined with the realization that quantitative approaches to credit and market risk management ignore operational risks, has prompted many banks to take a closer look at operational risk management. Indeed, the fact that the risk of extreme loss from operational failures was being neither adequately managed nor measured has prompted many regulators to issue guidelines to their members. In the United States, as early as 1997 the Federal Reserve Bank issued a document entitled “The Framework for Risk-focused Supervision of Large, Complex Institutions.” In June 1999 the Basel Committee (1999) signaled their intention to drive forward improvements in operational risk management by calling for capital charges for OR and thereby creating incentives for Banks to measure and monitor OR: “From a regulatory perspective, the growing importance of this risk category has led the committee to conclude that such risks are too important not to be treated separately within the capital framework.”

The New Capital Adequacy Framework (also referred to as the New Capital Accord) proposed by the Basel Committee exposed the lack of preparedness of the banking sector for operational risk events. Indeed, in a consultative document issued in January 2001, the Basel Committee reflected (2001a): “At present, it appears that few banks could avail themselves of an internal methodology for regulatory capital allocation [for OR]. However, given the anticipated progress and high degree of senior management commitment on this issue, the period until implementation of the New Basel Capital Accord may allow a number of banks to develop viable internal approaches.”

By the early 2000s regulators were beginning to “get tough” on failures in operational risk management. Severe financial penalties for failing to monitor and control operational procedures are now a reality. Two examples from the first quarter of 2003 illustrate the new regulatory environment.

BASEL COMMITTEE ON BANKING SUPERVISION

The Basel Committee on Banking Supervision represents the central banks of Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States. It was established at the end of 1974 and meets four times a year to develop supervisory standards and guidelines of best practice for national banking systems. Although the committee does not possess any formal supranational supervisory authority, its recommendations shape the international banking system. In 1988, the committee introduced a capital measurement system (commonly referred to as the Basel Capital Accord, or Basel I) that provided for the implementation of a risk measurement framework with a minimum capital charge. In June 1999, the committee issued a proposal for a New Capital Adequacy Framework (known as Basel II) to succeed Basel I. Basel II began the process of institutionalizing operational risk as a category for regulatory attention. Operational risk was required to be managed alongside other risks. Indeed, the proposed capital framework required banks to set aside capital for operational risk.

Mis-selling: In April 2003, Lincoln Assurance Limited was fined £485,000 by the United Kingdom's Financial Services Authority (FSA) for the mis-selling of 10-year savings plans by its appointed representative, City Financial Partners Limited, between September 1, 1998, and August 31, 2000. The operational risk event of mis-selling occurred because Lincoln Assurance Limited failed to adequately monitor City Financial Partners Limited and so failed to ensure that City Financial Partners Limited only recommended 10-year savings plans where they were appropriate for customers' needs.

Systems failure: In February 2003 the Financial Services Authority fined the Bank of Scotland (BoS) £750,000 for the failure of one of its investment departments to administer customers' funds appropriately. Between November 1999 and August 2001 problems with BoS systems used to administer personal equity plans (PEPs) and individual savings accounts (ISAs) implied that the bank could not be sure how much money it was holding on behalf of individual customers.

The above examples underscore the fact that as a prerequisite to good operational risk management, firms must have good processes and procedures in place. Systemic failings in internal procedures such as staff training and

information systems management and control put investors at risk and increase the risk of fraud going undetected and the possibility of catastrophic operational losses. In today's regulatory environment systemic failure also results in heavy regulatory fines. Good operational risk management makes sound commercial sense.

WHY A STATISTICAL APPROACH TO OPERATIONAL RISK MANAGEMENT?

The effectiveness of operational risk management depends crucially on the soundness of the methods used to assess, monitor, and control it. Commercial banks, investment banks, insurance companies, and pension funds, recognizing the central role of statistical techniques in market and credit risk management, are increasingly turning to such methods to quantify the operational risks facing their institutions. This is because modern statistical methods provide a quantitative technology for empirical science; they offer the operational risk manager the logic and methodology for the measurement of risk and for an examination of the consequences of that risk on the day-to-day activity of the business. Their use can improve senior management's awareness of the operational risk facing their institution by highlighting the expected losses due to operational failures, identifying unexpected losses, and emphasizing the risk associated with starving key business units of their institution of resources. In the language of senior management, statistical methods offer a mechanism for the assessment of risk, capital, and return. Given this, the continued search for value by customers and shareholders, and regulators seeking to force banks to set aside large amounts of capital to cover operational risks, a sound understanding of applied statistical methods for measuring, monitoring, and assessing operational risk is more than an optional extra, it is now a competitive imperative.

DISTINGUISHING BETWEEN DIFFERENT SOURCES OF RISK

Consider a bank that holds bonds in XYZ Corp. The value of the bonds will change over time. If the value fell due to a change in the market price of the bond, this would be market risk. If the value fell as a result of the bankruptcy of XYZ Corp, this would be credit risk. If the value fell because of a delivery failure, this would be operational risk. In each of the three cases the effect is a write-down in the bonds' value, but the specific cause is a consequence of different risks.

SUMMARY

Operational risk has been described as the oldest of risks, yet the application of statistical methods to operational risk management is a new and rapidly evolving field. This is because regulators have now elevated operational risk management to the forefront of risk management initiatives for banks and other financial institutions. The outcome is likely to be tighter internal controls and a drive toward better measurement, monitoring, and modeling of operational losses. Virtually all financial institutions are now paying attention to the application of statistical methods to their OR. In the remaining chapters of this book we focus attention on *what* statistical method to use and *how* these methods can improve a firm's overall management of OR events. As we shall see, there are significant benefits to be gained from the use of statistical methods. Of course, the careful use of statistical methods in itself is not an assurance of success, but it is a means of calculating in advance the probability and possible consequences of an unknown future OR event, allowing managers to make better-informed decisions.

REVIEW QUESTIONS

1. What do you consider to be the weaknesses of the definitions of OR discussed in this chapter? What alternative definitions would you consider more appropriate?
2. Despite being the oldest risk facing financial institutions, OR is the least monitored. Why?
3. What are the potential benefits to the firm, customers, and shareholder of monitoring OR? In your opinion, do these benefits outweigh the costs?
4. In what way could VaR be used in an OR context?
5. Why should statistical methods play a central role in the analysis of OR?

FURTHER READING

Further discussion surrounding the definition of operational risk can be found in British Bankers' Association (1997) and Jameson (1998). Details on the changing regulatory environment for risk management are documented in Basel Committee on Banking Supervision (1999, 2001a, 2001b, 2001c, 2003) and Alexander (2003).