P1.T1. Foundations of Risk

Bionic Turtle FRM Study Notes
Reading 1

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CROUHY, CHAPTER 1 RISK MANAGEMENT: A HELICOPTER VIEW

EXPLAIN THE CONCEPT OF RISK AND COMPARE RISK MANAGEMENT WITH RISK TAKING.

DEScribe the risk management process and identify problems and challenges which can arise in the risk management process.
Crouhy, Chapter 1 Risk Management: A Helicopter View

Explain the concept of risk and compare risk management with risk taking.

Describe the risk management process and identify problems and challenges which can arise in the risk management process.

Evaluate and apply tools and procedures used to measure and manage risk, including quantitative measures, qualitative assessment, and enterprise risk management.

Distinguish between expected loss and unexpected loss, and provide examples of each.

Interpret the relationship between risk and reward.

Describe and differentiate between the key classes of risks, explain how each type of risk can arise, and assess the potential impact of each type of risk on an organization.

Explain the concept of risk and compare risk management with risk taking.

We can refer to risk generally as *variability* or—in the case of financial risk specifically—we can refer to risk as *volatility*:

- Risk is the variability of adverse outcomes that are unexpected (general)
- Financial risk is volatility (volatility as special case of variability) of unexpected losses

Key aspects of this definition

- Risk is not expected loss
- **Risk is the potential for unexpected loss.** Further, greater variability (or uncertainty) around these unexpected losses is greater risk.
- While some authors distinguish between uncertainty and risk, requiring risk to be quantifiable uncertainty, Crouhy does not require this distinction. To Crouhy, even when uncertainty has not been quantified—or has yet to be quantified—the uncertainty still qualifies as risk. This is intuitive: unquantified risks can pose the greatest catastrophic threats

Technically, risk is **neither peril nor hazard**:

- A **peril** is the cause of a loss
- A **hazard** is a condition that increases the probability (and/or frequency and/or severity) of a loss
- A risk is the variability of an unexpected loss or adverse outcome (for our purposes)
Risk is not synonymous with the size of a cost or of a loss.

- Some costs that we expect in daily life are relatively large; e.g., food, fixed mortgage payments, college fees. These are large costs, but they are not a threat to our ambitions because they are reasonably predictable and are already allowed for in our plans.

- The **real risk** is that these costs will *suddenly rise unexpectedly*, or that some other cost will appear from nowhere and steal the money we’ve set aside for our expected outlays. The risk lies in how *variable* our costs and revenues really are.

- This day-to-day analogy makes it easier to understand the difference between the risk management concepts of *expected loss* (or expected costs) and *unexpected loss* (or unexpected cost). Understanding this difference is the key to understanding modern risk management concepts such as economic capital attribution and risk-adjusted pricing.

One of the key differences between an intuitive conception of risk and a more formal treatment is the use of statistics to define the extent and potential cost of any exposure.

- To develop a number for unexpected loss, a bank risk manager first identifies the risk factors that seem to drive volatility in any outcome and then uses statistical analysis to calculate the probabilities of various outcomes for the position or portfolio under consideration.

- This probability distribution can be used in various ways. For example, the risk manager might pinpoint the area of the distribution that the institution would find worrying, given the probability of this loss occurring.

The conception of risk as unexpected loss underpins two key concepts: value-at-risk (VaR) and economic capital.

- Value at risk (VaR) is a statistical measure that defines a particular level of loss in terms of its chances of occurrence; i.e., the “confidence level” of the analysis.
  - For example, we might say that our options position has a one-day VaR of $1.0 million at the 99.0% confidence level, meaning that our risk analysis shows that there is only a 1.0% probability of a loss that is greater than $1.0 million on any given trading day.

- Economic capital is the financial cushion that a bank employs to absorb unexpected losses
Describe the risk management process and identify problems and challenges which can arise in the risk management process.

The Risk Management Process

Risk management concerns the firm’s selection of its appropriate type(s) and level(s) of risk. Most business decisions involve a sacrifice of current resources for future uncertain returns. In this way, risk management and risk-taking aren’t opposites, but two sides of the same coin. At the heart of the management process is the capacity to make forward-looking choices about risk in relation to reward, and to evaluate performance.

The Risk Management Process (diagram)
Challenge: To manage unexpected levels of variability

Risk management is not the process of controlling and reducing expected losses (the concern of budgeting, pricing, and business efficiency). Rather, risk management is the process of understanding, costing, and efficiently managing unexpected levels of variability in the financial outcomes for a business. Even a conservative business can incur significant risk quite rationally, in light of:

- Its confidence in the way it assesses and measures the unexpected loss levels associated with its various activities
- The accumulation of sufficient capital or the deployment of other risk management techniques to protect against potential unexpected loss levels
- Appropriate returns from the risky activities, once the costs of risk capital and risk management are taken into account
- Clear communication with stakeholders about the company’s target risk profile (i.e., its solvency standard once risk-taking and risk mitigation are accounted for)

Challenge: Correlation risk

The tendency for things to go wrong together is not confined to the clustering of defaults among a portfolio of commercial borrowers. Whole classes of risk factors can begin to move together.

- In credit risk, real estate-linked loans are an example of correlation risk: they are often secured with real estate collateral, which tends to lose value at exactly the same time that the default rate for property developers and owners rises. In this case, the “recovery-rate risk” on any defaulted loan is itself closely correlated with the “default-rate risk.” The two risk factors acting together can sometimes force losses abruptly skyward.
- Anywhere in the world that we see risks that are lumpy and that are driven by risk factors that under certain circumstances can become linked together, we can predict that at certain times high “unexpected losses” will be realized. We can try to estimate how bad this problem is by looking at the historical severity of these events in relation to any risk factors that we define and then examining the prevalence of these risk factors in the particular portfolio under examination.

Challenge: Since the 2007–2009 financial crisis, risk managers have tried to move away from an overdependence on historical-statistical treatments of risk.

- Risk managers have shifted to an emphasis on scenario analysis and stress testing, which examine the impact or outcomes of a given adverse scenario or stress on a firm (or portfolio). The scenario may be chosen not on the basis of statistical analysis, but instead simply because it is both plausible and suitably severe—a judgment call.
- It can be difficult and unwise to remove statistical approaches from the picture entirely.
- In the more sophisticated forms of scenario analysis, the firm will need to examine how a change in a given macroeconomic factor (e.g., unemployment rate) leads to a change in a given risk factor (e.g., the probability of default of a corporation).
- Making this link means looking back to the past to examine the nature of the statistical relationship between macroeconomic factors and risk factors, though a degree of judgment must also be factored into the analysis.
The Risk Manager’s Job

The role of the risk manager is to uncover the sources of risk and make them visible to key decision makers and stakeholders in terms of probability.

The role of the risk manager is not to try and read a crystal ball.

- For example, the risk manager’s role is not to produce a point estimate of the U.S. dollar/euro exchange rate at the end of the year; but to produce a distribution estimate of the potential exchange rate at year-end and explain what this might mean for the firm (given its financial positions). These distribution estimates can then be used to help make risk management decisions, and also to produce risk-adjusted metrics such as risk-adjusted return on capital (RAROC).

The risk manager’s role is not just defensive: firms need to balance risk and reward in order to effectively compete in the long run.

- Implementing the appropriate policies, methodologies, and infrastructure to risk-adjust numbers and improve forward-looking business decisions is an increasingly important element of the modern risk manager’s job.

- These risk and profitability analyses aren’t always accepted or welcomed in the wider firm when they deliver bad news. Sometimes the difficulty is political, sometimes it is technical, and sometimes it is systemic.

- Defining the role and reporting lines of risk managers within the wider organization is very critical. If risk is not made transparent to key stakeholders, or those charged with oversight on their behalf, then the risk manager has failed.

- The trickiest balancing act in recent years has been finding the right relationship between business leaders and the specialist risk management functions
  - The relationship should be close, but not too close.
  - There should be extensive interaction, but not dominance. There should be understanding, but not collusion.
  - Where the balance of power lies will depend significantly on the attitude of senior managers and on the tone set by the board. It will also depend on whether the institution has invested in the analytical and organizational tools that support balanced, risk-adjusted decisions.

As the risk manager’s role is extended, we must increasingly ask difficult questions: “What are the risk management standards of practice” and “Who is checking up on the risk managers?”

- Out in the financial markets, the answer is hopefully the regulators.

- Inside a corporation, the answer includes the institution’s audit function, which is charged with reviewing risk management’s actions and its compliance with an agreed-upon set of policies and procedures.

- The more general answer is that risk managers will find it difficult to make the right kind of impact if the firm as a whole lacks a healthy risk culture, including a good understanding of risk management practices, concepts, and tools.
The Ups and Downs (“bumpy road”) in Risk Management

The discipline of risk management has had a bumpy ride. Reasons include: the fundamentally elusive and opaque nature of risk; and the relative immaturity of financial risk management.

- Rather than being a set of specific activities, computer systems, rules, or policies, risk management is better thought of as a set of concepts that allow us to see and manage risk in a particular and dynamic way.
- The biggest task in risk management is to put down deeper risk management roots in each organization.

**Ups**

- Dramatic explosion in the adoption of sophisticated risk management processes, driven by an expanding skill base and falling cost of risk technologies
- Increase in the skill levels and associated compensation of risk management personnel as sophisticated risk techniques have been adopted to measure risk exposures
- Birth of new risk management markets (e.g., credit, commodities, weather derivatives), representing highly innovative and potentially lucrative financial markets
- Birth of global risk management industry associations as well as a dramatic rise in the number of global risk management personnel
- Extension of the risk measurement frontier out from traditional measured risks such as market risk toward credit and operational risks
- Cross fertilization of risk management techniques across diverse industries from banking to insurance, energy, chemicals, and aerospace
- Ascent of risk managers in the corporate hierarchy to become chief risk officers, to become members of the top executive team (e.g., part of the management committee), and to report to both the CEO and the board of the company

**Downs**

- Firms have been tempted to over-rely on historical-statistical measures of risk—a weakness that improved stress testing seeks to address.
- Risk managers continue to find it a challenge to balance their fiduciary responsibilities against the cost of offending powerful business heads.
- Risk managers do not generate revenue and therefore have not yet achieved the same status as the heads of successful revenue-generating businesses.
- It’s proving difficult to make truly unified measurements of different kinds of risk and to understand the destructive power of risk interactions (e.g., credit and liquidity risk).
- Quantifying risk exposure for the whole organization can be hugely complicated and may descend into a “box ticking” exercise.
- The growing power of risk managers could be a negative force in business if risk management is interpreted as risk avoidance; it’s possible to be too risk-averse.