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衍生工具与风险管理

（第八版）

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An Introduction to Derivatives and Risk Management

8th Edition

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导 读

这是一本在国外广受欢迎的关于衍生工具与风险管理的入门教材，迄今为止已经修订了八版。

一、本书知识框架

作为一本入门教材，本书思路清晰，框架合理。在第一章导言之后，主要分为三个部分：

第一部分（第2章至第6章）主要涵盖关于期权的相关知识。其中，第2章介绍了期权及期权市场的基本概念和交易机制；第3章介绍了期权定价的基本原理（通常被称为边界条件），为后文的期权定价分析奠定了基础；第4章介绍了期权定价的简单二项式模型；第5章介绍了期权定价的Black-Scholes-Merton模型，这是目前期权定价的主要方法，也是1997年诺贝尔经济学奖得主Scholes教授和Merton教授凭以获奖的主要成就；第6章则探讨了期权的基本交易策略。

第二部分（第7章至第10章）主要涵盖关于远期、期货和互换的相关知识。其中，第7章介绍了远期和期货市场的基本特征；第8章介绍了远期、期货和期货期权定价的基本原理；第9章探讨了运用远期和期货进行套期保值的各种交易策略；第10章则专门介绍了三种主要互换产品（利率互换、货币互换和股票互换）的基本概念、定价以及交易策略。

第三部分（第11章至第13章）主要涵盖关于衍生工具及风险管理的高级专题。其中，第11章介绍了利率衍生工具（如远期利率协议和利率期权）的结构、定价及运用；第12章侧重于风险管理的定量方面，主要介绍了市场风险以及信用风险管理的相关技术与运用，如希腊字母、在险价值（VAR）、信用衍生工具等；第13章则侧重于风险管理的定性方面，主要探讨了在机构中进行风险管理时需要注意的各种问题。

纵观全书结构，作者在前两个部分依次介绍了期权、远期、期货、互换这四种衍生工具，对于每一种衍生工具都大致遵循了“发展历史—基本概念和交易机制—定价原理—交易策略”这一写作思路，清晰分析了不同衍生工具之间的区别和联系。接着，作者在第三部分集中探讨了关于衍生工具和风险管理的高级专题。在这一部分，考虑到利率衍生工具的重要性，作者用单独一章对其进行了详细的介绍；

而对于风险管理这一重要内容，作者则分为两章从定量和定性两个方面对此进行深入的讲解。本书向读者展示了一个非常清晰严谨的分析框架，也向读者提供了非常细致深入的讲解，是一本不可多得的极好的衍生工具与风险管理的入门教材。

二、本书的主要特点

与其他的同类型教材相比，本书具有以下一些主要特点：

1. 非常强调理论在实践中的运用。书中所有重要的概念和原理都通过具体的实例来清晰说明，力图实现“永远不会失去与现实世界的联系”这一目标。

2. 力求最低程度上借助数学工具。尽管衍生工具无可避免地是一种技术性的主题，但在本书中，即使是微积分的知识也所涉不多，因此非常适合于初入门或数学基础不好的读者学习。

3. 衍生工具的定价估值和交易策略并重。这一方面与本书的入门性质相吻合，另一方面也体现了作者对实际运用的重视。

4. 丰富的案例和图表。书中提供了大量的案例和图表，以帮助初学者获取直观的感性认识，从而可以更好地理解相关的知识点。

5. 每章后都提供了大量具有针对性的习题和思考题，以帮助读者通过练习来更好地理解和掌握本章的学习内容。

6. 强调运用软件来辅助学习。作者在本书的教学支持网站（http://www.cengage.com/international）上提供了大量已经编写好的Excel计算表、程序等供大家下载，同时在书中也通过“软件展示专栏”（Software Demonstrations）详细阐述了如何运用这些计算软件来辅助学习，从而帮助读者更好地理解书中的相关知识点。

7. 强大的教学支持网站（http://www.cengage.com/international）。该网站上提供了丰富的教学支持资源，包括可供下载的教学幻灯片、计算软件、技术文档（Technical note）、勘误表等。

8. 此外，本书还有一些贯穿全书的基本特征，例如：每章开头都是一段与本章主题密切相关的来自业界人士的引言；书中的重要术语都以黑体字突出显示；用大量的页边注释来概括总结重要的知识点等。

三、第8版的新特点

与之前的版本相比，本书第8版主要在以下几个方面进行了更新：

1. 对相关的市场数据、网址、法规制度等进行了更新。

2. 将第7版中的“衍生工具专栏”（Derivative Tools）更名为“理论联系实际专栏”（Making the Connection），同时增加了相关的案例，以期将衍生工具与风险管理的理论与实践更好地联系在一起。

3. 继续保留并进一步丰富了第7版中的技术文档（Technical Notes）。这些技术文档存放在本书的教学支持网站上，主要涵盖了相关的推导和证明，以及一些更高级的专题。

4. 将每章后的习题细分成两类：一是概念题（Concept Checks），侧重于考察对本章重要概念的理解，并在书末的附录中提供了相应的答案；二是习题和思考题（Questions and Problems），侧重于考查相关的计算和运用等，在另外的答案手册（Solutions Manual）中可以找到相应的答案。同时，本版的习题量相比之前的版本也有了一定程度的增加。

总之，本书是一本相当不错的金融工程、金融衍生工具和风险管理的入门教材，适合大学本科教学、研究生教学、MBA教学、读者自学以及公司培训等用途。当然，在具体使用时，读者或教师还可以进一步根据自身的需要和具体情况进行一定的取舍。

改编者　陈淼鑫

2015年5月

关于本书

内容简介

本书涵盖了金融衍生工具的基本内容以及相应的风险管理知识。书中首先系统地介绍了期权、远期、期货、互换等基础性金融衍生工具的基本概念、市场机制、定价原理和交易策略，然后针对目前世界上应用最广泛、最重要的一类衍生工具——利率衍生工具进行了深入浅出的分析和讲解，最后专门从定量和定性两个角度探讨了相应的风险管理问题。

作为一本在国外广受欢迎的金融工程教材，本书适合于金融、投资、财务管理等相关专业本科生、硕士生、MBA教学使用，可用于金融工程、衍生产品等课程，也非常适合作为金融工程、衍生产品和风险管理领域的培训教材，同时可供金融从业者和对金融领域有兴趣者自学使用，亦是一本优秀的可供查阅的市场手册。

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Brief Contents

Contents

CHAPTER 1
Introduction

It is only by risking our persons from one hour to another that we live at all.

William James
The Will to Believe, 1897

CHAPTER OBJECTIVES

- **Provide brief introductions to the different types of derivatives: options, forward contracts, futures contracts, and swaps**
- **Reacquaint you with the concepts of risk preference, short selling, repurchase agreements, the risk-return relationship, and market efficiency**
- **Define the important concept of theoretical fair value, which will be used throughout the book**
- **Explain the relationship between spot and derivative markets through the mechanisms of arbitrage, storage, and delivery**
- **Identify the role that derivative markets play through their four main advantages**
- **Address some criticisms of derivatives**

In the course of running a business, decisions are made in the presence of risk. A aecision maker can confront one of two types of risk. Some risks are related to the underlying nature of the business and deal with such matters as the uncertainty of future sales or the cost of inputs. These risks are called **business risks**. Most businesses are accustomed to accepting business risks. Indeed, the acceptance of business risks and its potential rewards are the foundations of capitalism. Another class of risks deals with uncertainties such as interest rates, exchange rates, stock prices, and commodity prices. These are called **financial risks**.

Financial risks are a different matter. The paralyzing uncertainty of volatile interest rates can cripple the ability of a firm to acquire financing at a reasonable cost, which enable it to provide its products and services. Firms that operate in foreign markets can have excellent sales performance offset if their own currency is strong. Companies that use raw materials can find it difficult to obtain their basic inputs at a price that will permit profitability. Managers of stock portfolios deal on a day-to-day basis with wildly unpredictable and sometimes seemingly irrational financial markets.

Although our financial system is replete with risk, it also provides a means of dealing with risk in the form of derivatives. **Derivatives** are financial instruments whose returns are derived from those of other financial instruments. That is, their performance depends on how other financial instruments perform. Derivatives serve a valuable purpose in providing a means of managing financial risk. By using derivatives, companies and individuals can transfer, for a price, any undesired risk to other parties who either have risks that offset or want to assume that risk.

Although derivatives have been around in some form for centuries, their growth has accelerated rapidly during the last several decades. They are now widely used by corporations, financial institutions, professional investors, and individuals. Certain types of derivatives are traded actively in public markets, similar to the stock exchanges with which you are probably already somewhat familiar. The vast majority of derivatives, however, are created in private transactions in over-the-counter markets. Just as a corporation may buy a tract of land for the purpose of ultimately putting up a factory, so may it also engage in a derivatives transaction. In neither case is the existence or amount of the transaction easy for outsiders to determine. Nonetheless, we have fairly accurate data on the amount of derivatives activity in public markets and reasonably accurate data, based on surveys, on the amount of derivatives activity in private markets. We shall explore the public market data in later chapters. If you need to be convinced that derivatives are worth studying, consider this: *The Bank for International Settlements of Basel, Switzerland, estimated that at the end of 2007, over-the-counter derivatives contracts outstanding worldwide covered underlying assets of over $596 trillion. In comparison, gross domestic product in the United States*

at the end of 2007 was about $15 trillion. As we shall see later, measuring the derivatives market this way can give a false impression of the size of the market. Nonetheless, the market value of these contracts totals about $9.1 trillion, making the derivatives market a sizable force in the global economy.

This book is an introductory treatment of derivatives. Derivatives can be based on **real assets**, which are physical assets and include agricultural commodities, metals, and sources of energy. Although a few of these will come up from time to time in this book, our focus will be directed toward derivatives on **financial assets**, which are stocks, bonds/loans, and currencies. In this book you will learn about the characteristics of the institutions and markets where these instruments trade, the manner in which derivative prices are determined, and the strategies in which they are used. Toward the end of the book, we will cover the way in which derivatives are used to manage the risk of a company.

This chapter welcomes you to the world of derivatives and provides an introduction to or a review of some financial concepts that you will need in order to understand derivatives. Let us begin by exploring the derivatives markets more closely and defining what we mean by these types of instruments.

DERIVATIVE MARKETS AND INSTRUMENTS

An asset is an item of ownership having positive monetary value. A liability is an item of ownership having negative monetary value. The term "instrument" is used to describe either assets or liabilities. Instrument is the more general term, vague enough to encompass the underlying asset or liability of derivative contracts. A contract is an enforceable legal agreement. A security is a tradeable instrument representing a claim on a group of assets.

In the markets for assets, purchases and sales require that the underlying asset be delivered either immediately or shortly thereafter. Payment usually is made immediately, although credit arrangements are sometimes used. Because of these characteristics, we refer to these markets as **cash markets** or **spot markets**. The sale is made, the payment is remitted, and the good or security is delivered. In other situations, the good or security is to be delivered at a later date. Still other types of arrangements allow the buyer or seller to choose whether or not to go through with the sale. These types of arrangements are conducted in derivative markets.

In contrast to the market for assets, derivative markets are markets for contractual instruments whose performance is determined by the way in which another instrument or asset performs. Notice that we referred to derivatives as contracts. Like all contracts, they are agreements between two parties—a buyer and a seller—in which each party does something for the other. These contracts have a price, and buyers try to buy as cheaply as possible while sellers try to sell as dearly as possible. This section briefly introduces the various types of derivative contracts: options, forward contracts, futures contracts, and swaps and related derivatives.

Options

An **option** is a contract between two parties—a buyer and a seller—that gives the buyer the right, but not the obligation, to purchase or sell something at a later date at a price agreed upon today.

The option buyer pays the seller a sum of money called the price or premium. The option seller stands ready to sell or buy according to the contract terms if and when the buyer so desires. An option to buy something is referred to as a **call**; an option to sell something is called a **put**. Although options trade in organized markets, a large

amount of option trading is conducted privately between two parties who find that contracting with each other may be preferable to a public transaction on the exchange. This type of market, called an over-the-counter market, was actually the first type of options market. The creation of an organized options exchange in 1973 reduced the interest in over-the-counter option markets; however, the over-the-counter market has been revived and is now very large and widely used, mostly by corporations and financial institutions.

Most of the options that we shall focus on in this textbook are options that trade on organized options exchanges, but the principles of pricing and using options are very much the same, regardless of where the option trades. Many of the options of most interest to us are for the purchase or sale of financial assets, such as stocks or bonds. However, there are also options on futures contracts, metals, and foreign currencies. Many other types of financial arrangements, such as lines of credit, loan guarantees, and insurance, are forms of options. Moreover, stock itself is equivalent to an option on the firm's assets.

Forward Contracts

A **forward contract** is a contract between two parties—a buyer and a seller—to purchase or sell something at a later date at a price agreed upon today. A forward contract sounds a lot like an option, but an option carries the right, not the obligation, to go through with the transaction. If the price of the underlying good changes, the option holder may decide to forgo buying or selling at the fixed price. On the other hand, the two parties in a forward contract incur the obligation to ultimately buy and sell the good.

Although forward markets have existed for a long time, they are somewhat less familiar. Unlike options markets, they have no physical facilities for trading; there is no building or formal corporate body organized as the market. They trade strictly in an over-the-counter market consisting of direct communications among major financial institutions.

Forward markets for foreign exchange have existed for many years. With the rapid growth of derivative markets, we have seen an explosion of growth in forward markets for other instruments. It is now just as easy to enter into forward contracts for a stock index or oil as it was formerly to trade foreign currencies. Forward contracts are also extremely useful in that they facilitate the understanding of futures contracts.

Futures Contracts

A **futures contract** is also a contract between two parties—a buyer and a seller—to buy or sell something at a future date at a price agreed upon today. The contract trades on a futures exchange and is subject to a daily settlement procedure. Futures contracts evolved out of forward contracts and possess many of the same characteristics. In essence, they are like liquid forward contracts. Unlike forward contracts, however, futures contracts trade on organized exchanges, called **futures markets**. For example, the buyer of a futures contract, who has the obligation to buy the good at the later date, can sell the contract in the futures market, which relieves her of the obligation to purchase the good. Likewise, the seller of a futures contract, who is obligated to sell the good at the later date, can buy the contract back in the futures market, relieving him of the obligation to sell the good.

Futures contracts also differ from forward contracts in that they are subject to a daily settlement procedure. In the daily settlement, investors who incur losses pay the losses every day to investors who make profits. Futures prices fluctuate from day to day, and contract buyers and sellers attempt both to profit from these price changes and to lower the risk of transacting in the underlying goods. We shall learn more about this in Chapter 7.

Options on futures, sometimes called *commodity options or futures options*, are an important synthesis of futures and options markets. An option on a futures contract gives the buyer the right to buy or sell a futures contract at a later date at a price agreed upon today. Options on futures trade on futures exchanges, and are a rare case where the derivative contract and the instrument on which it is derived trade side by side in an open market. Although options on futures are quite similar to options on spot assets, there are a few important differences, which we shall explore later in this book.

Swaps and Other Derivatives

Although options, forwards, and futures compose the set of basic instruments in derivative markets, there are many more combinations and variations. One of the most popular is called a **swap**. A swap is a contract in which two parties agree to exchange cash flows. For example, one party is currently receiving cash from one investment but would prefer another type of investment in which the cash flows are different. The party contacts a swap dealer, a firm operating in the over-the-counter market, who takes the opposite side of the transaction. The firm and the dealer, in effect, swap cash flow streams. Depending on what later happens to prices or interest rates, one party might gain at the expense of the other. In another type of arrangement, a firm might elect to tie the payments it makes on the swap contract to the price of a commodity, called a commodity swap. As we shall show later, swaps can be viewed as a combination of forward contracts.

Interest rate swaps make up more than half of the $596 trillion notional principal over-the-counter derivatives market. But interest rate swaps are only one of many types of contracts that combine elements of forwards, futures, and options. For example, a firm that borrows money at a floating rate is susceptible to rising interest rates. It can reduce that risk, however, by buying a cap, which is essentially an option that pays off whenever interest rates rise above a threshold. Another firm may choose to purchase an option whose performance depends not on how one asset performs but rather on the better or worse performing of two, or even more than two, assets; this is called an alternative option.

The different types of derivatives include options, forwards, futures, options on futures, swaps, and hybrids.

Some of these types of contracts are referred to as **hybrids** because they combine the elements of several other types of contracts. All of them are indications of the ingenuity of participants in today's financial markets, who are constantly creating new and useful products to meet the diverse needs of investors. This process of creating new financial products is sometimes referred to as **financial engineering**. These hybrid instruments represent the effects of progress in our financial system. They are examples of change and innovation that have led to improved opportunities for risk management. Swaps, caps, and many other hybrid instruments are covered in Chapters 10 and 11.

THE UNDERLYING ASSET

All derivatives are based on the random performance of something. That is why the word "derivative" is appropriate. The derivative *derives* its value from the performance of something else. That "something else" is often referred to as the *underlying asset*. The term underlying asset, however, is somewhat confusing and misleading. For instance, the underlying asset might be a stock, bond, currency, or commodity, all of which are assets. However, the underlying "asset" might also be some other random element such as the weather, which is not an asset. It might even be another derivative, such as a futures contract or an option. Hence, to avoid saying that a derivative is on an "underlying something," we corrupt the word "underlying," which is an adjective, and treat it as