高等学校金融学类英文版教材

An Introduction to Derivatives & Risk Management 6e

Don M. Chance

衍生工具与风险管理

陈　蓉(厦门大学)　改编
郑振龙(厦门大学)　审校

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图字：01-2004-6492 号

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ISBN: 0-324-17800-X

981-265-070-9

图书在版编目（CIP）数据

衍生工具与风险管理=An Introduction to Derivatives Risk Management be：英文改编 /（美）钱斯（Chance,D.M.）. —北京：高等教育出版社，2005.1

ISBN 7-04-016165-6

Ⅰ.衍... Ⅱ.钱... Ⅲ.金融－风险管理－英文 Ⅳ.F830.2

中国版本图书馆CIP数据核字（2004）第127904号

策划编辑 于 明 **责任编辑** 于 明 **封面设计** 刘晓翔 **责任印制** 陈伟光

出版发行	高等教育出版社	**购书热线**	010-64054588
社　　址	北京市西城区德外大街 4 号	**免费咨询**	800-810-0598
邮政编码	100011	**网　　址**	http://www.hep.edu.cn
总　　机	010-58581000		http://www.hep.com.cn
经　　销	新华书店北京发行所		
印 刷 者	涿州市星河印刷有限公司		
开　　本	850 × 1168　1/16	**版　　次**	2005 年 1 月第 1 版
印　　张	26.75	**印　　次**	2005 年 1 月第 1 次印刷
字　　数	780 000	**定　　价**	36.00 元

本书如有缺页、倒页、脱页等质量问题，请到所购图书销售部门联系调换。

物料号：16165-00

出版前言

自教育部在《关于加强高等学校本科教学工作 提高教学质量的若干意见》【教高（2001）4号】中提出双语教学的要求后，各地高校相继开设了一系列双语教学课程。这对提高学生的学科和外文水平，开阔国际视野，培养创新型人才起到了重要的作用；一大批教师也逐渐熟悉了外文授课，自身的教学水平和能力得到较大提高，具备国际学术思维的中青年教师脱颖而出。同时，经过近几年的双语教学实践，国外原版教材量大、逻辑不够清晰、疏离中国现实等问题也影响了双语教学的效果。因此，对外版教材进行本土化的精简改编，使之更加适合我国的双语教学已提上教材建设日程。

为了满足高等学校经济管理类双语课程本土化教学的需要，在教育部高等教育司的指导和支持下，高等教育出版社同Thomson Learning等国外著名出版公司通力合作，在国内首次推出了金融、会计、经济学等专业的英文原版改编教材。本套教材的遴选、改编和出版严格遵循了以下几个原则：

1. 择优选取权威的新版本。在各专业选书论证会上，我们要求入选改编的教材不仅是在国际上多次再版的经典之作的最新版本，而且是近年来已在国内被试用的优秀教材。

2. 改编后的教材力求内容规范简明，逻辑更加清晰，语言原汁原味，适合中国的双语教学。选择的改编人既熟悉原版教材内容又具有本书或本门课程双语教学的经验；在改编过程中，高等教育出版社组织了知名专家学者召开了数次改编和审稿会议，改编稿征求了众多教师的意见。

3. 改编后的教材配有较丰富的辅助教学支持资源，教师可在网上免费获取。同时，改编后的教材厚度适中，定价标准较低。

由于原作者所处国家的政治、经济和文化背景等与我国不同，对书中所持观点，敬请广大读者在阅读过程中注意加以分析和鉴别。

此次英文改编教材的出版，得到了很多专家学者的支持和帮助，在此深表谢意！我们期待这批英文改编教材的出版能对我国经济管理类专业的教学能有所帮助，欢迎广大读者给我们提出宝贵的意见和建议。

高等教育出版社

2005年1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，主要介绍了期权、远期、期货、互换等基础性金融衍生工具的基本知识、市场制度、定价原理和市场运用策略，并针对目前世界上应用最广泛、最重要的一类衍生产品——利率衍生工具进行了深入浅出的分析和介绍，最后专门从定量和定性两个角度讨论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。

作者简介

Don M. Chance，美国路易斯安那州立大学金融学教授，主要研究方向为金融衍生产品和风险管理。曾在美国东南部的一家大银行就职，曾任美国Virginia Tech学院Pamplin商学院首任金融风险管理联合教授，拥有CFA资格。由于其实际从业经历和学术背景，Chance教授无论在顶级学术刊物还是在职业期刊上均有大量论文发表，并在业界咨询、学术顾问等方面具有丰富经验。

改编及审校者简介

陈蓉，金融学博士，现任教于厦门大学金融系，主要研究方向为金融工程和固定收益证券，同时在厦门东南融通系统工程有限公司博士后工作站从事“中国结构化衍生产品设计、定价与风险管理研究”的博士后课题研究。曾在《经济学家》、《中国经济问题》、《证券市场导报》等国内公开刊物发表十多篇论文。

郑振龙，金融学博士，美国加州大学洛杉矶分校富布莱特研究学者，现任厦门大学经济学院副院长、金融工程教授、博士生导师，中国金融学年会主席、中国金融学会金融工程专业委员会常务委员、福建省金融学会副会长。在国内外刊物上公开发表了百余篇学术论文，出版了25部（含合作）著、编、译著作。

教学支持资源（见本书教学支持说明页）

1. Instructor's Manual
2. PowerPoint
3. Test Bank
4. Others

导 读

作为一本在国外广受欢迎的金融工程教材，这本《衍生工具与风险管理》迄今为止已经修订了六版。从全书来看，它之所以在美国的本科和MBA教学中被大量使用，显然与其清晰完整的知识框架、深入浅出的详细讲解、理论和实际的大量结合等特征具有很大的关系。

一、清晰完整的知识框架

首先值得一提的是本书的知识框架设计，阅读国外教材的学习者常常会因为国外作者不甚清晰的知识结构框架和独特的逻辑思维而深感困惑，这本教材在这些方面做得非常之好。从全书框架来看，在第一章导言之后，主要分为三个部分：

第一部分（第二章至第六章）针对期权进行讲解和分析。第二章介绍了期权的基本概念和期权市场的基础知识；第三章谈到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；第四章提出了最简单的期权定价二项式模型；第五章涉及的是Black-Scholes模型，这是期权定价的主要工具，也是1997年诺贝尔经济学奖获得者Scholes和Merton凭以获奖的主要成就；第六章则讨论了期权的简单交易策略。

第二部分（第七章至第十章）涵盖了关于远期、期货和互换工具的主要内容。第七章介绍了远期和期货市场的基本特征；第八章对远期、期货和期货期权定价原理进行了分析；随后在第九章对这些工具的主要运用——套期保值策略进行了讨论；最后第十章专门对互换的概念、定价和投资策略进行了介绍。

在前两部分的基础上，第三部分（第十一章至第十三章）主要涉及的是较为高级的内容。第十一章阐述了利率衍生工具；第十二章主要针对风险管理中的定量问题进行分析，着重强调了诸如希腊字母、VAR、信用风险等专题；第十三章则侧重于风险管理的定性方面，讨论的重点主要集中在机构或公司进行风险管理时所需要注意的各种问题上。

从以上知识结构可以看到，本书在整体上遵循的是“导言—期权—远期（期货）和互换工具—衍生工具和风险管理的高级专题（利率衍生工具和风险管理）”的教学思路，这一基本思路是经过慎重考虑的：期权放在第一部分，使得读者能够在第二部分更好地理解期货期权的内容；作为规模最大的衍生工具，互换在金融世界中的重要性日益凸现，有必要单列一章加以讲解，利率衍生工具也出于同样的原因而单列一章；最后将风险管理的内容分为两章分别讲解定量和定性的内容，有助于读者更好地理解风险管理的有关问题。

除此之外，在写作细节上，本书作者显然也非常注重逻辑的清晰和结构的对称与完整。通读全书，读者将会发现每个衍生工具的讲解都完全遵循“发展历史—定义—市场制度—定价—交易策略”的学习线索。即使在很小的方面，作者也力求实现所有讲解内容的对称与完整，以第三章的期权定价原理为例，在讲解看涨期权和看跌期权的定价原理（边界条

件）时，读者可以发现完全相同的逐步深入的分析结构，即使在例子、图表方面也是对称的，作者并不因为有一定的重复性而有所省略，从而向读者展示了一个非常完整严谨的分析结构和框架，也向读者提供了非常清晰和细致深入的讲解。通读全书，我们处处都可以发现作者的类似匠心，对于一本金融工程的入门教材来说，这一点是相当重要而难得的。

二、深入浅出的详细讲解

本书的另一个重要特征在于技术性和数学性的最小化，以及深入浅出的讲解风格。从这一点来看，本书强调的是入门性质，因此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，因而非常适合于初入门和数学基础不太好的读者学习。在全书的分析和讲解中，读者可以发现两个很明显的特点：第一，作者显然深谙初学者的心理和学习难点所在，在很多专业性较强的书籍略过的地方着墨甚多，讲解非常清晰，读者常常可以发现作者所提及和讲解的正是自己在学习过程中刚刚想到的一些困惑之处，例如第八章中对期货价格和风险溢酬关系的详细讨论，在很多书中都难以找到。第二，作者使用了大量的案例、图表来讲解各种问题，从而使得读者可以获得一个感性的认识。总之，由于知识盲点较少，讲解详细具体，仔细阅读和学习过本书的读者，一般都可以在入门层面上获得对金融衍生工具和风险管理问题的一个基本认识，由于这一特点，本书实际上也可以作为一个衍生证券和风险管理问题的备查资料来源。

三、理论和实际的结合

在本书中，作者力图实现的是“永远不会和现实世界失去联系”，因此非常强调理论的实际运用。从内容上看，本书的一个突出特征是市场制度问题、定价问题和交易策略问题三者的分量差异不大（尤其是定价和策略问题基本并重），这和大量金融工程书籍强调定价问题显然有所差异，这一特征和本书的入门性质相吻合，也体现了作者对实际运用的重视。从讲解来看，文中所有的概念和思想都运用了非常清晰的案例、图表加以表述和支持，从而引导读者学会将理论更好地运用到实践中去。

最后，需要提及的是贯穿全书的一些基本特征：每一章都以业界人士的引言开头，这些引言基本上都和本章内容有关；书中的重要术语都用黑体字标出；全书用大量的页边注释说明要点；在必要的地方加入Derivatives Tools工具栏，用于进一步讲解相关概念、应用和拓展；在网站http://chance.swlearning.com上提供了相应的教学支持资源，包括可下载的教学幻灯片、计算软件等，在文中相应的地方还提供了对软件的使用说明。教师手册则包含了对章后习题的解答。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入门教材，适用于大学本科教学、研究生教学、MBA教学、读者自学和公司培训等用途，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。

审校及改编者

2004年11月

郑重声明

CONTENTS

Introduction

Chapter 1

The speed of money is faster than it's ever been.

Loleen Doerrer
Time, April 11, 1994, p. 33

In the course of running a business, decisions are made in the presence of risk. A decision 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.** Another class of risks deals with the uncertainty of such factors as interest rates, exchange rates, stock prices, and commodity prices. These are called **financial risks.** Most businesses are accustomed to accepting business risks. Indeed the acceptance of business risks and the potential rewards that can come with it are the foundations of capitalism.

But 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 will 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 20 years. 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,

Chapter Objectives

- To provide brief introductions to the different types of derivatives: options, forward contracts, futures contracts, options on futures, and swaps
- To reacquaint you with the concepts of risk preference, short selling, the risk-return relationship, and market efficiency
- To define the important concept of theoretical fair value, which will be used throughout the book
- To explain the relationship between spot and derivative markets through the mechanisms of arbitrage, storage, and delivery
- To identify the role that derivative markets play through their four main advantages
- To address some criticisms of derivatives

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 2001, over-the-counter derivatives contracts outstanding worldwide covered underlying assets of over $111 trillion. In comparison, gross domestic product in the United States at the end of 2001 was about $10 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 $3.8 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 on 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 shall cover how derivatives are used in managing 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 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

In the markets for assets, purchases and sales require that the underlying good or security 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 let the buyer or seller 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 how 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 trade on organized options exchanges, but the principles of pricing and using options are pretty much the same, regardless of where the option trades. Most of the options of our interest are for the purchase or sale of financial assets, such as stocks or bonds. There are, however, also options on futures contracts, metals, and foreign currencies. Many other types of financial arrangements, such as lines of credit, loan guaranties, 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 in this country 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 him or her of the obligation to purchase the good. Likewise, the seller of the futures contract, who is obligated to sell the good at the later date, can buy the contract back in the futures market, relieving him or her 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 them every day to investors who make profits. We shall learn more about this in Chapter 7.

Futures prices fluctuate from day to day, and contract buyers and sellers attempt to profit from these price changes and to lower the risk of transacting in the underlying goods.

Options on Futures

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.

Swaps make up slightly more than half of the $111 trillion national principal over-the-counter derivatives market. But 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, 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 other hybrid instruments are covered in Chapters 12 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. The underlying asset might be a stock, bond, currency, or commodity, all of which are assets. But 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 a noun. Hence, we say that the derivative is "on an underlying." This incorrect use of the word "underlying" serves a good purpose, however, because it enables us to avoid using the word "asset."

Some Important Concepts in Financial and Derivative Markets

Before undertaking any further study of derivative markets, let us review some introductory concepts pertaining to investment opportunities and investors. Many of these ideas may already be familiar and usually are applied in the context of trading in stocks and bonds. These concepts also apply with slight modifications to trading in derivatives.

Risk Preference

We have known that most individuals are characterized by **risk aversion**, which means they expect to get **risk premium**, the additional return they expect to earn on average to justify taking the risk.

Although most individuals are indeed risk averse, it may surprise you to find that in the world of derivative markets, we can actually pretend that most people are **risk neutral**. ("Risk neutral" means that investors are indifferent to risk, they require no compensation for risk and the expected return on all securities is the risk-free interest rate.) No, we are not making some heroic but unrealistic assumption. It turns out that we obtain the same results in a world of risk aversion as we do in a world of risk neutrality. Although this is a useful point in understanding derivative markets, we shall not explore it in much depth at the level of this book. Yet without realizing it, you will probably grow to accept and understand derivative models and the subtle implication of risk neutrality.

Short Selling

Selling short or, sometimes, shorting involves selling an asset that is not owned by the seller but borrowed from a broker. Through shorting, the short seller creates a liability and is obligated to someday buyback the asset and return it to the broker. Obviously the seller is doing so in the anticipation of the price falling. In general, short selling of stocks can be quite complex and expensive relative to buying stocks, whereas short selling of derivatives is as simple as buying derivatives. Thus, it is common to find an investor holding a stock and protecting it by selling short a derivative.

We should note that anyone who has an obligation to purchase something at a later date has the equivalent of a short sale. It is not necessary to have borrowed stock from a broker. In either case an increase in the price will be harmful.