清华金融学系列英文版教材

Options, Futures, and Other Derivatives

Fourth Edition

John C. Hull ／ 著

期权、期货和其他衍生品

（第4版）

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出 版 说 明

为了适应经济全球化的发展趋势，满足国内广大读者了解、学习和借鉴国外先进的管理经验和掌握经济理论的前沿动态，清华大学出版社与国外著名出版公司合作影印出版一系列英文版经济管理方面的图书。我们所选择的图书，基本上是已再版多次、在国外深受欢迎、并被广泛采用的优秀教材，绝大部分是该领域中较具权威性的经典之作。在选书的过程中，我们得到了很多专家、学者的支持、帮助和鼓励，在此表示谢意！清华金融学系列英文版教材由清华大学经济管理学院和北京大学经济学院朱武祥、刘群艺、宋逢明、杨炘等老师审阅，在此一并致谢！

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。

我们期望这套影印书的出版对我国经济科学的发展能有所帮助，对我国经济管理专业的教学能有所促进。

欢迎广大读者给我们提出宝贵的意见和建议；同时也欢迎有关的专业人士向我们推荐您所接触到的国外优秀图书。

清华大学出版社第三编辑室

2001.8

总序

世纪之交，中国与世界的发展呈现最显著的两大趋势——以网络为代表的信息技术的突飞猛进，以及经济全球化的激烈挑战。无论是无远弗界的因特网，还是日益密切的政治、经济、文化等方面的国际合作，都标示着21世纪的中国是一个更加开放的中国，也面临着一个更加开放的世界。

教育，特别是管理教育总是扮演着学习与合作的先行者的角色。改革开放以来，尤其是20世纪90年代之后，为了探寻中国国情与国际上一切优秀的管理教育思想、方法和手段的完美结合，为了更好地培养高层次的“面向国际市场竞争、具备国际经营头脑”的管理者，我国的教育机构与美国、欧洲、澳洲以及亚洲一些国家和地区的大量的著名管理学院和顶尖跨国企业建立了长期密切的合作关系。以清华大学经济管理学院为例，2000年，学院顾问委员会成立，并于10月举行了第一次会议，2001年4月又举行了第二次会议。这个顾问委员会包括了世界上最大的一些跨国公司和中国几家顶尖企业的最高领导人，其阵容之大、层次之高，超过了世界上任何一所商学院。在这样高层次、多样化、重实效的管理教育国际合作中，教师和学生与国外的交流机会大幅度增加，越来越深刻地融入到全球性的教育、文化和思想观念的时代变革中，我们的管理教育工作者和经济管理学习者，更加真切地体验到这个世界正发生着深刻的变化，也更主动地探寻和把握着世界经济发展和跨国企业运作的脉搏。

我国管理教育的发展，闭关锁国、闭门造车是绝对不行的，必须同国际接轨，按照国际一流的水准来要求自己。正如朱镕基总理在清华大学经济管理学院成立十周年时所发的贺信中指出的那样：“建设有中国特色的社会主义，需要一大批掌握市场经济的一般规律，熟悉其运行规则，而又了解中国企业实情的经济管理人才。清华大学经济管理学院就要敢于借鉴、引进世界上一切优秀的经济管理学院的教学内容、方法和手段，结合中国的国情，办成世界第一流的经管学院。”作为达到世界一流的一个重要基础，朱镕基总理多次建议清华的MBA教育要加强英语教学。我体会，这不仅因为英语是当今世界交往中重要的语言工具，是连接中国与世界的重要桥梁和媒介，而且更是中国经济管理人才参与国际竞争，加强国际合作，实现中国企业的国际战略的基石。推动和实行英文教学并不是目的，真正的目的在于培养学生——这些未来的企业家——能够具备同国际竞争对手、合作伙伴沟通和对抗的能力。按照这一要求，清华大学经济管理学院正在不断推动英语教学的步伐，使得英语不仅是一门需要学习

的核心课程，而且渗透到各门专业课程的学习当中。

课堂讲授之外，课前课后的大量英文原版著作、案例的阅读对于提高学生的英文水平也是非常关键的。这不仅是积累相当的专业词汇的重要手段，而且是对学习者思维方式的有效训练。

我们知道，就阅读而言，学习和借鉴国外先进的管理经验和掌握经济理论动态，或是阅读翻译作品，或是阅读原著。前者属于间接阅读，后者属于直接阅读。直接阅读取决于读者的外文阅读能力，有较高外语水平的读者当然喜欢直接阅读原著，这样不仅可以避免因译者的疏忽或水平所限而造成的纰漏，同时也可以尽享原作者思想的真实表达。而对于那些有一定外语基础，但又不能完全独立阅读国外原著的读者来说，外文的阅读能力是需要加强培养和训练的，尤其是专业外语的阅读能力更是如此。如果一个人永远不接触专业外版图书，他在获得国外学术信息方面就永远会比别人差半年甚至一年的时间，他就会在无形中减弱自己的竞争能力。因此，我们认为，有一定外语基础的读者，都应该尝试一下阅读外文原版，只要努力并坚持，就一定能过了这道关，到那时就能体验到直接阅读的妙处了。

在掌握大量术语的同时，我们更看重读者在阅读英文原版著作时对于西方管理者或研究者的思维方式的学习和体会。我认为，原汁原味的世界级大师富有特色的表达方式背后，反映了思维习惯，反映了思想精髓，反映了文化特征，也反映了战略偏好。知己知彼，对于跨文化的管理思想、方法的学习，一定要熟悉这些思想、方法所孕育、成长的文化土壤，这样，有朝一日才能真正“具备国际战略头脑”。

以往，普通读者购买和阅读英文原版还有一个书价的障碍。一本外版书少则几十美元，多则上百美元，一般读者只能望书兴叹。随着全球经济合作步伐的加快，目前在出版行业有了一种新的合作出版的方式，即外文影印版，其价格几乎与国内同类图书持平。这样一来，读者可以不必再为书价发愁。清华大学出版社这些年在这方面一直以独特的优势领先于同行。早在1997年，清华大学出版社敢为人先，在国内最早推出一批优秀商学英文版教材，规模宏大，在企业界和管理教育界引起不小的轰动，更使国内莘莘学子受益良多。

为了配合清华大学经济管理学院推动英文授课的急需，也为了向全国更多的MBA试点院校和更多的经济管理学院的教师和学生提供学习上的支持，清华大学出版社再次隆重推出与世界著名出版集团合作的英文原版影印商学教科书，也使广大工商界人士、经济管理类学生享用到最新最好质优价廉的国际教材。

祝愿我国的管理教育事业在社会各界的大力支持和关心下不断发展、日进日新；祝愿我国的经济建设在不断涌现的大批高层次的面向国际市场竞争、具备国际经营头脑的管理者的勉力经营下早日中兴。

赵纯均 教授

清华大学经济管理学院院长

全国工商管理硕士教育指导委员会副主任

To
My Family

Preface

This book is appropriate for graduate and advanced undergraduate elective courses in business, economics, and financial engineering. It is also suitable for practitioners who want to acquire a working knowledge of how derivatives can be analyzed.

One of the key decisions that must be made by an author who is writing in the area of derivatives concerns the use of mathematics. If the level of mathematical sophistication is too high, the material is likely to be inaccessible to many students and practitioners. If it is too low, some important issues will inevitably be treated in a rather superficial way. In this book, great care has been taken in the use of mathematics. Nonessential mathematical material has been either eliminated or included in end-of-chapter appendices. Concepts that are likely to be new to many readers have been explained carefully, and many numerical examples have been included.

This book provides a unifying approach to the valuation of all derivatives — not just futures and options. The book assumes that the reader has taken an introductory course in finance and an introductory course in probability and statistics. No prior knowledge of options, futures contracts, swaps, and so on is assumed. It is not therefore necessary for students to take an elective course in investments prior to taking a course based on this book.

Changes in This Edition

This edition contains more material than the third edition. The material in the third edition has been updated and its presentation has been improved in a number of places. The major changes include:

1. A new chapter (chapter 14) has been included on value at risk.
2. A new chapter (chapter 15) has been included on estimating volatilities and correlations. GARCH models are covered in much more detail than in the third edition.
3. Chapter 19 contains much new material and explains the role played by martingales and measures in the valuation of derivatives.
4. Chapter 20 on the standard market models for valuing interest rate derivatives has been revised. It now uses the material in chapter 19 to provide a more complete discussion of the models for valuing bond options, caps, and swap options.

5. There are now two chapters on equilibrium and no-arbitrage models of the term structure (chapters 21 and 22). Chapter 21 covers equilibrium models and one-factor no-arbitrage models of the short rate. Chapter 22 covers two-factor models of the short rate, the HJM model, and the LIBOR market (BGM) model.
6. Chapter 4 on Interest Rates and Duration has been rewritten to make the material clearer and more relevant.
7. Chapter 23 on Credit Risk has been rewritten to reflect developments in this important area.
8. More material has been added on volatility smiles and volatility skews (chapter 17).
9. The sequencing of the material has been changed slightly. Volatility smiles and alternatives to Black–Scholes now appear before the chapter on exotic options, which in turn appears before the material on interest rate derivatives.
10. The notation has been improved and simplified. S_0 and F_0 are used to denote the asset price and the forward price today (that is, at time zero) and the cumbersome "$T - t$" no longer appears in most parts of the book.
11. A glossary of terms has been included.
12. Many new problems and questions have been added.

Software

New Excel-based software, DerivaGem, is included with the book. This software is a big improvement over the software included with previous editions. It has been carefully designed to complement the material in the text. Users can calculate options prices, imply volatilities, and calculate Greek letters for European options, American options, exotic options, and interest rate derivatives. Interest rate derivatives can be valued either using Black's model or a no-arbitrage model. The software can be used to display binomial trees (see for example Figure 16.3 and Figure 21.11) and provide many different charts showing the impact of different variables on either option prices or the Greek letters.

The software is described more fully at the end of the book. Updates to the software can be downloaded from my Web site

http://www.mgmt.utoronto.ca/~hull

Slides

Several hundred PowerPoint slides can be downloaded from my Web site. The slides now use only standard fonts. Instructors can adapt the slides to meet their own needs.

Answers to Questions

Solutions to the end-of-chapter problems in the first three editions were available only in the Instructor's Manual. Over the years many people have asked me to make the solutions more generally available. I have hesitated to do this because it would prevent instructors from using the problems as assignment questions.

In this edition I have dealt with this issue by dividing the end-of-chapter problems into two groups: "Questions and Problems" and "Assignment Questions". There are over 450 Questions and Problems and solutions to these are in a book *Options, Futures, & Other Derivatives: Solutions Manual,* which is published by Prentice Hall. There are about 80 Assignment Questions. Solutions to these are available only in the Instructor's Manual.

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Many people have played a part in the production of this book. The academics and practitioners who have made excellent and useful suggestions include Farhang Aslani, Jas Badyal, Emilio Barone, Giovanni Barone-Adesi, Alex Bergier, George Blazenko, Laurence Booth, Phelim Boyle, Peter Carr, Don Chance, J.-P. Chateau, Ren-Raw Chen, George Constantinides, Michel Crouhy, Emanuel Derman, Brian Donaldson, Dieter Dorp, Scott Drabin, Jerome Duncan, Steinar Ekern, David Fowler, Louis Gagnon, Dajiang Guo, Jörgen Hallbeck, Ian Hawkins, Michael Hemler, Steve Heston, Bernie Hildebrandt, Kiyoshi Kato, Kevin Kneafsy, Bill Margrabe, Izzy Nelkin, Neil Pearson, Paul Potvin, Shailendra Pandit, Eric Reiner, Richard Rendleman, Gordon Roberts, Chris Robinson, Cheryl Rosen, John Rumsey, Ani Sanyal, Klaus Schurger, Eduardo Schwartz, Michael Selby, Piet Sercu, Duane Stock, Edward Thorpe, Yisong Tian, P.V. Viswanath, George Wang, Jason Wei, Bob Whaley, Alan White, Hailiang Yang, and Victor Zak. I am particularly grateful to Eduardo Schwartz, who read the original manuscript for the first edition and made many comments that led to significant improvements, and to Richard Rendleman and George Constantinides, who made specific suggestions that led to improvements in this edition.

The first three editions of this book were very popular with practitioners and much of the material in the book has been greatly influenced by the informal contacts I have had with practitioners. The students in my elective courses on derivatives at the University of Toronto have also influenced the evolution of the book.

Alan White, a colleague at the University of Toronto (formerly a colleague at York University), deserves a special acknowledgment. Alan and I have been carrying out joint research in the area of derivatives for over 15 years. During that time we have spent countless hours discussing different issues concerning derivatives. Many of the new ideas in this book, and many of the new ways used to explain old ideas, are as much Alan's as mine. Alan read the original version of this book very carefully and made many excellent suggestions for improvement.

The staff at Prentice Hall have been a continual source of encouragement to me as this project has progressed. I would particularly like to thank Paul Donnelly, my editor, who has always shown a keen interest in the development of this book.

I welcome comments on the book from readers. My e-mail address is

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简 明 目 录

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