Fifth Edition

An Introduction to Derivatives and Risk Management

Don M. Chance

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Virginia Tech

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Preface

It has now been eleven years since the first edition of this book came out. Probably no area in finance has undergone as much change as that of derivatives and risk management. In fact, this book was once called *An Introduction to Options and Futures.* The previous edition was called *An Introduction to Derivatives.* Reflecting the continuing change in the industry, we are now calling it *An Introduction to Derivatives and Risk Management.* Who knows what the sixth edition will be called? (Any suggestions?) But looking on the bright side, a dynamic field makes for an exciting subject to study and one well worth exploring for its potential for career development.

This book is all about the study of financial instruments called derivatives. The types of derivatives you will learn about are options, forwards, futures, swaps, and a number of variations of these basic instruments. Derivatives are powerful and effective tools for altering the risk of an organization or portfolio of securities. In this book you will learn the characteristics of these instruments, how they are priced, how they are used in strategies, and how to manage the risk they create as well as how to use them to manage already existing risk.

Organization of the Book

The book is divided into four main parts. First there is an introductory chapter, which gives an overview of the subject. Then Part One, consisting of Chapters 2–7, covers options. Chapter 2 introduces you to the basic characteristics of options and their markets. Chapter 3 presents the fundamental principles of pricing options. These principles are often called boundary conditions, and while we do tend to think of them as fundamental, they are nonetheless quite challenging. Chapter 4 presents the simple binomial model for pricing options. Chapter 5 covers the Black-Scholes model, which is the premier tool for pricing options and for which a Nobel Prize was awarded in 1997. Chapters 6 and 7 cover option trading strategies.

Part Two covers forward and futures contracts and begins with Chapter 8, which introduces the basic characteristics of forward and futures markets. Chapter 9 presents the principles for pricing forward and futures contracts. Chapter 10 covers hedging strategies, which is the primary use

of these contracts. Chapter 11 covers some advanced applications of futures.

Part Three deals with advanced topics, but do not let that put you off. Most of what is covered here is simply applications of material previously learned. Chapter 12 covers options on futures, which combine elements of both options and futures. Chapter 13 on foreign currency derivatives combines options, forwards, and futures into one chapter. In addition you will meet the currency swap, one of the most widely used financial derivatives. Chapter 14 covers interest rate derivatives, which are your first derivatives that are not based on the price of a security, but rather on an interest rate. These are among the most actively traded, and herein you will learn about the most popular derivative, the interest rate swap. Chapter 15 covers some advanced topics and strategies, which are mostly extensions of previous topics and strategies.

Chapter 16 is the capstone chapter and deals with a broad range of topics on risk management. Derivative instruments allow the efficient buying and selling of risk. In this chapter we learn more about how companies manage this risk. In addition we cover a variety of related topics and get a chance to see how some organizations have done a poor job of managing risk.

Key Features of the Book

Some of the key features of the book are:

- An emphasis on practical application of theory; all ideas and concepts are presented with clear illustrations. You never lose touch with the real world.
- Minimal use of technical mathematics. While derivatives is unavoidably a technical subject, calculus is not necessary to learn the material at this level. (Note: Some calculus is used in appendices, but this material is not essential.)
- Balanced emphasis on strategies and pricing.
- The book is liberally illustrated with over 100 figures and supported with over 100 tables.
- Over 300 end-of-chapter questions and problems allow you to test your skills (solutions are available to adopting instructors).
- Over 200 margin notes, which are short (a few sentences) summaries of key points, are found throughout.
- Key terms. At the end of each chapter is a list of important terms you should be able to define before going on. There are an average of 18 per chapter.
- Quotes to start each chapter. While introductory students may not always catch the meaning behind quotes, they all have some meaning re-

lated to the topic of the chapter. The individuals cited are quite a varied bunch, but are mostly practitioners in the field.

- Derivatives in Action. About every other chapter includes a section called Derivatives in Action, which contains side stories that are not critical to but supplement the material.
- Bold terms. Throughout the chapter important terms are in bold.
- Software: The book comes with software consisting of one Windows program and various Excel spreadsheets. Throughout the book are sections called Software Demonstrations, which contain explicit illustrations of how to use the software.
- Appendices containing lists of symbols, formulas, and references.
- Glossary containing over 500 terms defined.
- An index, of course.
- PowerPoint Presentation slides, which are available for instructors adopting the book. Some other PowerPoint presentations that I have seen with finance textbooks are mostly just outlines; these contain much more detail.
- An *Instructor's Manual*, which contains answers to the end-of-chapter questions and problems and true-false and multiple choice tests. The *IM* also comes with software that consists of the PowerPoint slides, the true-false and multiple choice tests and the end of chapter problem solutions, all in Adobe Acrobat format. These can be freely distributed to students, thereby saving them the cost of copying.
- A Web site, www.cob.vt.edu/finance/faculty/dmc/IDRM5E.htm, which will contain updated information and errata. Yes, the book will probably have some errors, but at least I'm willing to tell you about them.

I cannot emphasize too much how I think this book blends theory and practice. All points are illustrated as much as possible using practical situations. For example, the option results are covered by following a single company's options throughout the book. When strategies are covered, we learn the theory, examine the algebraic equations that describe what is happening, and observe the results either with a table or graph.

New Features of the Fifth Edition

For those familiar with previous editions, the following are new features:

- The option examples, which were formerly illustrated using Digital Equipment, have all been replaced with new examples using America Online. This was not a voluntary change; Digital Equipment was bought out by Compaq and no longer has its own identity. Nonetheless,

the new change has brought a fresh new opportunity to invigorate the book by using a young, contemporary, and extremely well-known technology company. As of this writing, AOL is involved in a merger with Time Warner, but the new firm is expected to be called AOL Time Warner so I will just continue to call it AOL.

- A slight change of notation. The symbol for the exercise price, formerly E, is now X. My choice of E comes from the classic 1973 Nobel Prize winning article by Robert Merton, but today most everyone uses X or K, with the former being my preference. In addition where it is necessary to designate time points, the stock price today is now S with a zero subscript.
- A separation of the option pricing models chapter into two chapters. Formerly, I packed the binomial and Black-Scholes models into the same chapter. Now the binomial model is Chapter 4 and the Black-Scholes model is Chapter 5. This separation allows us to give a little more coverage to each. In particular, the Black-Scholes coverage spends more time validating the assumptions, describing the properties of the model, and showing how delta hedging works.
- Elimination of the old Chapter 8. This was formerly a chapter primarily consisting of review material from other finance courses, with an emphasis on pricing assets in the spot market. Over the years, I have received feedback that suggests that this chapter probably is not necessary and I, myself, have often skipped it or covered it only very lightly in teaching. The essential material from this chapter has been seamlessly integrated into other chapters.
- An increased emphasis on over-the-counter derivative markets. With an apology to the derivatives exchanges, I believe this growing emphasis is simply a recognition of reality. I also believe no competing book gives this much recognition to the OTC market. Rest assured, if you are using this book, that you are in touch with what's going on in the market today. Or at least at the time I am writing this. Things change fast.
- Integration of the euro. Many of the foreign currency examples have been reworked to incorporate the euro. While the British pound, Japanese yen, Swiss franc, and Canadian dollar are still around, there is no longer a German mark, French franc and nine other currencies. These should disappear from textbooks and they already have from this one.
- Further Reading. A new feature to this fifth edition, these are a short list of articles at the end of each chapter that point you in the right direction to learn more. With but a few exceptions (such as classic articles), the list was selected with practicality and readability in mind.

- Significant improvements in coverage of the following topics.
  - Swaps
  - Value at Risk
  - Credit derivatives
  - Accounting for derivatives

On the coverage of accounting, probably no other issue has occupied the concerns of users as well as regulators in this industry in recent years. FAS 133, which goes into effect in June 2000, establishes standards for the accounting for derivatives transactions. I believe this is the first derivatives text to tackle the accounting issue head-on. While the coverage is not sufficient to make you an expert, you will learn how the accounting entries are made for various types of derivatives hedges and how these affect the balance sheet and income statement.

Use of the Book

At Virginia Tech, we place considerable emphasis on derivatives and risk management. Undergraduate and MBA students can, more or less, concentrate in it. We use this book as an elective undergraduate two-semester sequence, though students can stop after the first semester. We cover eight chapters in the first semester and eight in the second. For a one-semester course, the instructor would need to decide how much to emphasize of either options or forwards/futures. I would attempt to emphasize options with a blend of forwards/futures and still try to cover as much as possible of interest rate derivatives and risk management. The latter topics usually get short-changed, but they are so important in today's world, that one ought to work them in somehow.

For a one-semester course, I would probably cover Chapters 1-10, a small part of 11, all of 14, part of 15 and most of 16. Considerable discretion would have to be used, however, in that not all of the material in Chapters 1-10 could be covered.

A number of schools use this book at the MBA level. It all depends on how one wants to approach the subject and the backgrounds and technical skills of the students. The book has also been used successfully in professional training programs.

As for prerequisites, I believe a single course in finance is sufficient as a prerequisite, but a second course of almost any finance topic, would be very helpful to have had or be taking contemporaneously.

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Many individuals contributed greatly to this edition of the book. I would like to thank the following people who formally reviewed the book, provided unsolicited comments, or just responded when I asked if I should make this change or that: Mike Hemler, Steven C. Mann, Bruce Bagamery, Don Rich, Robert Brooks, Randy Billingsley, Tie Su, Jill Wetmore, James Gatti, George Longsen Ye, Jerry James, Joseph Vu, Bruce Rosser, Nancy White Huckins, and Nejat Seyhun. From previous editions, I would like to thank Bill Welch, Mark Rzepczynski, Don Chambers, Peggy Fletcher, Avraham Kamara, Ann Kremer, Jerome Duncan, Dennis Draper, Bob Klemkosky, Doug Hearth, Shanta Hegde, Hun Park, Joan Junkus, Raman Kumar, Jack Broughton, Craig Ruff, Mary Davis, Gopi Maliwal, Herald Stout, Andy Chen, Louis Scott, Eric Chang, John Mitchell, Majed Muhtaseb, Jot Yau, Jorge Urrutia, Ramon Rabinovitch, Bill Reichenstein, Nusret Cakici, Margaret Smoller, John McDonald, Kuldeep Shastri, Jeff Peterson, Patricia Smith, Don Fehrs, Ashok Robin, Jim Alexander, Tim Krehbiel, Kashi Tiwari, Meir Schneller, Trey Snow, Lucy Ackert, Dan Mohan, Dick Rendleman, Phoebe Mix, and Calin Valsan, Their comments and suggestions have greatly improved the text.

A special note of thanks goes to my graduate student, Hillary Fredericks, who worked extensively on this project, especially in the conversion of the option examples from Digital Equipment to America Online and in the notational change. She now has the unique perspective of having seen the book as a student in my class several years ago and as a contributor and hopefully some day will be teaching from it.

I would also like to thank the Harcourt editorial team, led by Mike Reynolds, finance executive editor, Terri House, senior developmental editor, and Jim Patterson, senior project editor. Others on the Harcourt team included Susan Journey, James McDonald, Linda Blundell, Charlie Watson, and Carolyn Crabtree.

I thank my wife Jan, and my children Kim and Ashley, who have grown up as this book has gone through its many revisions. They neither know nor care what the book is about but probably view it as a sibling, given the amount of time I have devoted to it.

I had always felt that the errors in a book should, through attrition over the years, disappear. I have learned otherwise. Although no one wants errors to remain, if you ever find a book in its fifth edition without any errors, you can be assured that the author is simply correcting old material and not keeping the book up-to-date. With a field as dynamic as derivatives, extensive changes are inevitable. Despite Herculean efforts to cleanse this work, there are surely some errors remaining. I feel fairly confident, however, that they are not errors of fact, but merely accidental oversights and

perhaps typos that just did not get caught as I read and re-read the material. Unlike most authors, who I think would rather hide known errors, I maintain a list of the errors on the book's Web site (again, that's www.cob.vt.edu/finance/faculty/dmc/IDRM5E.htm). If you see something that does not make sense, check the Web address mentioned above and see if it's there. If not, then send me an e-mail.

Or just send me an e-mail anyway, students or faculty. Tell me what you like or don't like about the book. I would love to hear from you.

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