Trading & Exchanges

Market Microstructure for Practitioners

Larry Harris

Financial Management Association Survey and Synthesis Series

OXFORD UNIVERSITY PRESS

Trading and Exchanges

FINANCIAL MANAGEMENT ASSOCIATION

Survey and Synthesis Series

The Search for Value: Measuring the Company's Cost of Capital
Michael C. Ehrhardt

Managing Pension Plans: A Comprehensive Guide to Improving Plan Performance
Dennis E. Logue and Jack S. Rader

Efficient Asset Management: A Practical Guide to Stock Portfolio Optimization and Asset Allocation
Richard O. Michaud

Real Options: Managing Strategic Investment in an Uncertain World
Martha Amram and Nalin Kulatilaka

Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing
Hersh Shefrin

Dividend Policy: Its Impact on Firm Value
Ronald C. Lease, Kose John, Avner Kalay, Uri Loewenstein, and Oded H. Sarig

Value Based Management: The Corporate Response to Shareholder Revolution
John D. Martin and J. William Petty

Debt Management: A Practitioner's Guide
John D. Finnerty and Douglas R. Emery

Real Estate Investment Trusts: Structure, Performance, and Investment Opportunities
Su Han Chan, John Erickson, and Ko Wang

Trading and Exchanges: Market Microstructure for Practitioners
Larry Harris

Trading and Exchanges

Market Microstructure for Practitioners

LARRY HARRIS

OXFORD
UNIVERSITY PRESS
2003

OXFORD
UNIVERSITY PRESS

Oxford New York
Auckland Bangkok Buenos Aires Cape Town Chennai
Dar es Salaam Delhi Hong Kong Istanbul Karachi Kolkata
Kuala Lumpur Madrid Melbourne Mexico City Mumbai Nairobi
São Paulo Shanghai Singapore Taipei Tokyo Toronto

Published by Oxford University Press, Inc.
198 Madison Avenue, New York, New York, 10016
www.oup.com

Oxford is a registered trademark of Oxford University Press

Library of Congress Cataloging-in-Publication Data
Harris, Larry, 1956–
Trading and exchanges : market microstructure for practitioners / Larry Harris
p. cm.—(Financial Management Association survey and synthesis series)
Includes bibliographical references and index.
ISBN 0-19-514470-8
1. Markets. 2. Exchange. 3. Commerce. I. Title. II. Series.
HF5470 .H37 2002
332.64—dc21

2002004622

9 8 7 6 5 4 3 2 1

Printed in the United States of America
on acid-free paper

This book is dedicated to the memory of the victims
of the September 11, 2001, terrorist acts
in New York, Virginia, and Pennsylvania
and to the honor of those people
whose heroic actions on that day saved so many lives.

This page intentionally left blank

Acknowledgments

Many people contributed to the success of this project with their encouragement, advice, knowledge, and expertise. I would not have started this project without their interest, and I would not have completed it without their support. The book is much better for their contributions.

I received my first encouragement as a graduate student at the University of Chicago, long before I knew anything about market microstructure. Professor Arnold Zellner advised me to publish a book based on lectures I would give when I became a professor. Although it seemed unimaginable to me at the time, I never forgot his advice or his confidence in me. I look forward to the time when I will read a book written by one of my students.

Several publishers suggested that I write this book. I particularly appreciate the interest shown by editors Mike Junior, Randall Adams, Maureen Riopelle, Kenneth MacLeod, and Paul Donnelly. I have no doubt that they all would have been very helpful in the development of this book. I regret that I could not work with them all. Their encouragement, enthusiasm, and vision helped kindle and sustain my interest.

This book would not have been possible without the many insights that I learned from my academic colleagues. I especially appreciate the lessons that they taught me, and the strong expressions of interest and valuable constructive criticism that they have given me. I wish to acknowledge the following colleagues by name:

Anat Admati
Yacob Amihud
Jim Angel
Gail Belonsky
Hank Bessembinder
Bruno Biais
Bernie Black
Fischer Black
Marshall Blume
Michael Brennan
Corinne Bronfman
Mark Carhart
Henry Cheeseman
Kal Cohen
Harry DeAngelo
Linda DeAngelo
Ian Domowitz
Rob Engle
Wayne Ferson
Steve Figlewski
Margaret Forster
Doug Foster
Jennie France
Bill Freund
Mendy Fygenson
Stuart Gabriel
Ann Gillette
Tom Gilligan
Larry Glosten
Charles Goodhart
Sandy Grossman
Joe Grundfest
Eitan Gurel
Yasushi Hamao
Puneet Handa
Joel Hasbrouck
Kaj Hedvall
Pierre Hillion
Craig Holden
Kose John
Charles Jones
Avner Kalay
Eugene Kandel
Jon Karpoff
Don Keim
Laura Kodres
Pete Kyle
Josef Lakonishok
Charles Lee
Ruben Lee
Bruce Lehmann
Ken Lehn
Marc Lipson
Andy Lo
Francis Longstaff
Bob Lucas
Craig MacKinlay
Ananth Madhavan
Steve Manaster
Terry Marsh
Tom McInish
Haim Mendelson
Morris Mendelson

Bob Miller
Mert Miller
David Modest
Dale Morse
Belinda Mucklow
Harold Mulherin
Rob Neal
Anthony Neuberger
Maureen O'Hara
Daniel Orr
J. Peake
André Perold
Mitch Petersen
Paul Pfleiderer
Avri Ravid
Mark Ready
Jay Ritter
Kevin Rock
Ailsa Roell
Tavy Ronen
Ehud Ronn
Mark Rubinstein
Tony Saunders
Myron Scholes
Bob Schwartz
Eduardo Schwartz
Bill Schwert
Duane Seppi
Kuldeep Shastri
Alan Shapiro
Eric Sirri
Sy Smidt
Vernon Smith
Chester Spatt
Sanjay Srivastava
Jim Stancill
Laura Starks
Dave Stewart
Hans Stoll
René Stulz
Avanidhar Subrahmanyam
Sheridan Titman
Walt Torous
Anand Vijh
S. Viswanathan
Dan Weaver
Mark Weinstein
Ivo Welch
Ingrid Werner
Randy Westerfield
Bob Whaley
David Whitcomb
Joe Williams
Bob Wood

This book would not have been creditable were it not for the many practitioners and regulators who have shared their time with me to explain what they do. I particularly appreciate the generosity and encouragement that the following individuals have extended to me:

Stanley Abel
Howard Baker
Frank Baxter
Brandon Becker
Gil Beebower
Jeff Benton
Dale Berman
Charles Black
David Booth
Harold Bradley
Kurt Bradshaw
Pearce Bunting
Richard Cangelosi
Jim Cochrane
David Colker
Cromwell Coulson
Larry Cuneo
David Cushing
Harry Davidow
Pina DeSantis
Mike Edleson
Jim Farrell
Tom Fay
Gene Finn
Ed Fleischman
Russ Fogler
Gifford Fong
Stuart Fraser
Dean Furbush
Jim Gallagher
Gary Gastineau
Brian Geary
Steven Giacoma
Jim Gilmore
Phil Ginsberg
Gary Ginter
Keith Goggin
Wendy Gramm
Dick Grasso
Bob Greber
Leo Guzman
Spence Hilton
Dave Hirschfeld
Blair Hull
Billy Johnson
Rick Ketchum
Rick Kilcollin
Ray Killian
Howard Kramer
Ken Kramer
Arthur Leavitt
Charlie Lebens
Marty Leibowitz
Dave Leinweber
Rich Lindsey
Evelyn Liszka
Bob Litterman
Bill Lupien
Bernie Madoff
Peter Madoff
Steven Malin
David Malmquist
Tim McCormick
Dick McDonald
Seth Merrin
Dick Michaud
Mark Minister
Nate Most
Annette Nazareth
Gene Noser
Bill Pratt
Eddie Rabin
Murali Ramaswami
Bill Ryan
Henry Sasser
Evan Schulman
Andy Schwarz
Christina Sciotto

Jim Scott
Jim Shapiro
David Shaw
Katy Sherrerd
Fred Siesel
Deborah Soesbee
George Sofianos
Eric Sorensen
Olof Stenhammar
Rob Telsar
Artie Tolendini
Jack Treynor
Wayne Wagner
Jeffery Wecker
Genie Williams
Steve Wallman
Steve Wunsch
Steve Youngren
Dorit Zeevi

Four people particularly influenced the development of this book. Wayne Wagner thoroughly reviewed an early draft of the manuscript. His suggestions greatly improved every part of the book. Craig Holden used early drafts of the text in his trading course at Indiana University. I am especially indebted to him for the confidence and vision he expressed to various publishers. Ananth Madhavan commented on early drafts of the book and supplied many bibliographic references. I have greatly appreciated having him as a colleague at USC. Finally, Jack Treynor was instrumental in helping me appreciate the importance of the zero-sum game in trading. Most principles of market microstructure somehow involve properties of zero-sum games.

Several generous sponsors provided financial support for this project. I received "angel financing" from the New York Stock Exchange (Dick Grasso, Billy Johnston, Jim Cochrane, and George Sofianos), the Jefferies Group (Frank Baxter), Mellon Capital Management Corporation (Bill Fouse and Tom Loeb), Bernard L. Madoff Investment Securities (Bernie and Peter Madoff), First Canada Securities International (Jim Medlock), Cantor Fitzgerald (Stuart Fraser and Phil Ginsberg), and First Quadrant (Rob Arnott). Their early support allowed me to take time off from my teaching to start this project. I am also grateful to Oxford University Press, which provided a developmental grant with which I was able to pay research assistants.

I appreciate the support provided to me by the USC Marshall School of Business through the Fred V. Keenan Chair in Finance. The generosity of our donors has been instrumental to the remarkable development of our faculty, school, and university over the last ten years under the leadership of Marshall School deans Jack Borsting and Randolph Westerfield, and USC president Steven B. Sample. Our most important accomplishments appear in the largely unseen influences that we have upon our students, and upon the policy makers and business executives who rely upon our research when making significant decisions. Our work rarely provides us with suitable opportunities to thank everyone who makes it possible. I am grateful for this opportunity to thank our donors for their confidence, vision, and support. I am especially pleased to recognize Fred Keenan, whose loyalty and generous support to the university have been an inspiration to us all.

Many people at USC helped me with the preparation of the manuscript. I am grateful both for their contributions to this book and for teaching me to write better. I gratefully thank my research assistants—Namrata Aggarwal, Chris Bandouveris, Claire Yu Cui, Shane Enete, Cynthia Lee, Jeff Lin, Jennifer Ly, Anna Nguyen, Venky Panchapagesan, and Jia Ye—and my departmental assistants—Deborah Jacobs, Marilyn Johnson, Terry Lichvar, and Helen Pitts. I am particularly pleased to recognize Cynthia Lee for her very extensive assistance with grammar, style, and proofreading.

Several people were notably helpful with proofreading early drafts. I thank Jennifer Chang, Abby Harris, Naftali Harris, Naomi Harris, Hai Lu,

and especially Joey Engelberg for the careful attention that they paid to the manuscript.

My family and friends also contributed to the successful completion of this book in more ways that would be appropriate to list here. I particularly appreciate the support given to me by Alex Baskin, Jack Birns, Brian Greene, Bernard Harris, Devera Harris, Sam Jason, and Alissa Rimon. My wife, Abby, and my children were especially supportive. Without their support, I would not have attempted or completed this project.

My editors at Oxford University Press were extremely helpful with the development of this book. Copyeditor Beth Wilson and Managing Editor Lisa Stallings are skilled professionals whose contributions regrettably are rarely well recognized. They did an excellent job and were a pleasure to work with. I particularly appreciate the contributions of Executive Editor Paul Donnelly. Paul's vision brought this project to Oxford; his guidance greatly improved the book; and his promotion ensured that others would appreciate it.

Finally, I am indebted to the many students at USC who studied with me in my Trading and Exchanges course. Their interest in trading encouraged me to first offer the course in 1991. This book grew out of the lectures that developed to present the course to them. The lessons that I learned from my students while teaching Trading and Exchanges greatly influenced the organization and presentation of the topics that appear in this book. I believe that I have learned more from my students than from anyone else.

I have inevitably failed to acknowledge many people who richly deserve it. Regrettably, the ability to remember names easily is not one of the many gifts that I enjoy. Please forgive me for my oversight.

Thank you to everyone who has helped make this project successful.

Contents

Trading and Exchanges

This page intentionally left blank

1
Introduction

Markets are fascinating. They change constantly as prices adjust to new information, as winning traders replace losing traders, and as new technologies evolve.

Highly skilled professional traders employ clever strategies in their search for trading profits. They ultimately profit from investors, gamblers, and foolish traders.

The stakes in some markets are very high. Traders may arrange multimillion-dollar trades in seconds. They sometimes make or lose fortunes overnight.

The prices that traders negotiate ultimately determine how market-based economies allocate their scarce resources. Free economies owe much of their wealth to their well functioning markets.

1.1 SCOPE OF THE BOOK

This book is about trading, the people who trade securities and contracts, the marketplaces where they trade, and the rules that govern trading. You will learn about investors, brokers, dealers, arbitrageurs, retail traders, day traders, rogue traders, and gamblers; exchanges, boards of trade, dealer networks, ECNs (electronic communications networks), crossing markets, and pink sheets; single price auctions, open outcry auctions, and brokered markets; limit orders, market orders, and stop orders; program trades, block trades, and short trades; price priority, time precedence, public order precedence, and display precedence; insider trading, scalping, and bluffing; and investing, speculating, and gambling. This book will teach you the origins of liquidity, transaction costs, volatility, informative prices, and trader profits.

This book is not about the securities and contracts that people trade. We will not consider how to value them, who should trade them, how to design them, or how to issue them. Books about investments and corporate finance examine these questions.

Market microstructure is the branch of financial economics that investigates trading and the organization of markets. This field of study has substantially grown in size and importance since the October 1987 stock market crash.

This book presents the economics of market microstructure in simple English prose. Although some simple mathematics and graphics appear in a few supplementary examples, I fully explain all essential concepts in the main text.

1.2 OBJECTIVES

This book will help you understand how markets work, and how governments and exchanges regulate them. You will learn how prices come to

reflect information about fundamental values, who makes markets liquid, and why some traders consistently profit from trading while others lose. You will be able to predict how various trading rules affect price efficiency, liquidity, and trading profits. Finally, you will understand the forces that govern regulatory processes.

With this knowledge, you can improve your trading strategies, and you can better manage the brokers who work for you. If you are—or aspire to be—a regulator or an exchange official, this knowledge will help you design better markets.

The primary objectives of this book are to understand the origins of the following characteristics of market quality:

- *Liquidity* Traders and regulators often talk about liquidity, but they are rarely careful about what they mean. This book explains what liquidity is, and where it comes from. If you intend to offer or take liquidity, you must understand it well.
- *Transaction costs* Traders must effectively manage their transaction costs to trade successfully. This book explains how to measure and manage transaction costs. If you trade actively, you must understand transaction costs.
- *Informative prices* Speculators must understand how and when prices become informative in order to trade successfully. Informative prices are essential to the wealth of our economy. This book explains the processes by which prices become informative. If you intend to speculate, you must understand price efficiency.
- *Volatility* Traders care about volatility because it can have a significant impact on their wealth. This book explains how prices become volatile, and how regulators try to control volatility. If risk scares you, you must understand volatility.
- *Trading profits* Trading is a zero-sum game in which some traders win and others lose. Traders who do not expect to win should refrain from trading. This book explains why some traders consistently win while other traders consistently lose. If trading profits interest you—whether you manage your trading yourself or have someone manage it for you—you must understand what determines trading profits.

The secondary objective of this book is to understand how market structure—trading rules and information systems—affect each of these five market characteristics.

1.3 INSTRUMENTS AND MARKETS

Market microstructure examines organized trading in instruments. *Instruments* include common stocks, preferred stocks, bonds, convertible bonds, warrants, options, futures contracts, forward contracts, foreign exchange contracts, swaps, reinsurance contracts, commodities, pollution credits, water rights, and even many betting contracts. Most ideas discussed in this book apply equally well to trading in all these instruments.

Legislatures and judges have created numerous legal definitions of the term "security." These definitions often distinguish between instruments that represent ownership of assets like stocks and bonds (usually called securities) and instruments that derive their values from commodities or from

other security values (derivative contracts). They also universally exclude betting contracts. We will pay attention to these distinctions only when they affect the markets through the regulatory process.

A *market* is the place where traders gather to trade instruments. That place may be a physical trading floor, or it may be an electronic system in which traders can easily communicate with each other. The New York Stock Exchange, the Chicago Mercantile Exchange, and the EuroNext Amsterdam Options Exchange are examples of markets where traders meet on trading floors. Nasdaq, the Euronext, the Hong Kong Futures Exchange, and the interbank foreign exchange market are examples of electronically linked markets. This book considers how trading markets are organized and how their rules affect traders.

1.4 A BRIEF OVERVIEW OF TRADING AND EXCHANGES

This section gives a brief overview of some main points introduced in this book. It provides you with an outline of what you can expect to learn from this book. Do not be alarmed if you do not understand it all now. The remainder of the book explains everything in detail.

Trading is a search problem. Buyers must find sellers, and sellers must find buyers. Every trader wants to trade at a good price. Sellers seek buyers willing to pay high prices. Buyers seek sellers willing to sell at low prices. Traders also must find traders who are willing to trade the *quantities*, or *sizes*, they desire. Traders who want to trade large quantities may have to find many willing traders to complete their trades.

Dealers and brokers help people trade. *Dealers* trade with their clients when their clients want to trade. The prices at which a dealer will buy and sell are the dealer's *bid* and *ask* prices. After they trade with their clients, dealers then try to trade out at a profit by selling what they have bought or by buying back what they have sold. In effect, clients pay dealers to take their trading problems. The dealers then try to solve them at a profit. Dealers profit by buying low and selling high. Successful dealers must be excellent traders.

Brokers are agents who arrange trades for their clients. They help their clients find traders who are willing to trade with them. They profit by charging commissions.

Patient traders obtain better prices than impatient traders do because they are willing to search longer and harder to arrange their trades at favorable terms. Impatient traders pay for the privilege of trading when they want to trade.

Traders who offer to trade give other people options to trade. These options sometimes are quite valuable. Traders who expose their offers can lose to clever traders who use various front-running trading strategies to extract these option values. Traders therefore must expose their offers very carefully. They should expose only to traders who are most likely to trade with them.

Traders who trade only to accommodate other traders risk trading with, and losing to, well-informed speculators. *Speculators* are traders who trade to profit from information they have about future prices. *Well-informed speculators* can predict futures prices better than other traders can. They then choose to buy or sell based upon which side they expect will be profitable.

Dealers lose to well-informed speculators because they end up being on the wrong side of the trade. Prices tend to move against their positions before they can trade out of them. All traders try to avoid trading with well-informed speculators.

Dealers recover their losses to informed speculators by widening the spread between the bid and ask prices at which they will buy and sell. Uninformed traders therefore pay more for their trades when dealers lose a lot to informed traders. In effect, uninformed traders lose to well-informed traders through the intermediation of dealers.

Traders who can estimate fundamental values cause prices to reflect their value estimates. They buy when price is below their value estimates and sell when price is above. Their buying pushes prices up, and their selling pulls prices down. They do not trade if they believe that prices reflect values. Well-informed traders make prices informative.

Bluffers can sometimes fool uninformed traders into trading unwisely. In general, they can profit if the price impacts of their buying and selling are not exactly opposite to each other. Since dealers may trade when bluffers want them to trade, dealers must be highly disciplined to avoid losing to bluffers.

Trading is a zero-sum game when gains and losses are measured relative to the market average. In a *zero-sum game*, someone can win only if somebody else loses. On average, well-informed speculators and bluffers win, and poorly informed traders and foolish traders lose. Informed traders can profit only to the extent that less informed traders are willing to lose to them.

Poorly informed traders trade for many reasons. *Investors* use the markets to move money from the present to the future. *Borrowers* do the opposite. *Hedgers* trade to manage financial risks they face. *Asset exchangers* trade one asset for another they value more. *Gamblers* trade to entertain themselves.

Exchanges and brokerages design markets to minimize the search costs of trading. They usually organize markets so that everyone who wants to trade gathers at the same place. A common gathering place helps traders find those traders who will offer the best prices.

Exchanges and brokerages once organized their markets exclusively on physical trading floors. Now they can do so within computerized communications networks that allow buyers and sellers to arrange their trades remotely. Electronic marketplaces have rapidly expanded as the costs of electronic communications technologies have dropped.

Most traders want to trade in well-established markets because other traders trade there. When many traders trade in the same place, arranging trades is very easy. The attraction of traders to other traders makes it hard to start new markets.

Entrepreneurs create new markets when old markets do not adequately meet the needs of a significant set of traders. Since traders face a diversity of trading problems, no single market can best meet every trader's needs. Many diverse markets may form when exchanges and brokerages compete to attract traders.

Arbitrageurs ensure that prices do not vary much across markets. When prices diverge, they buy in cheaper markets and sell in more expensive markets. The effect of their trading is to connect sellers in cheaper markets to buyers in more expensive markets.

An exchange's trading rules affect the quality of its markets. They determine the balance of power between informed traders and uninformed traders, between public traders and professional traders, and between large traders and small traders. Trading rules are very important.

Markets work best when they trade fungible instruments. An instrument is *fungible* if one unit (a share, a bond, a contract, etc.) of the instrument is economically indistinguishable from all other units. If that is so, buyers do not care which units they receive. Since all sellers offer identical units, buyers can buy from any seller who offers an attractive price. Sellers likewise can sell to any buyer. Fungible instruments therefore are easier to trade than instruments that have idiosyncratic characteristics. In derivative markets, the benefits of fungible instruments cause trading to concentrate in just a few standardized contracts.

1.5 KEY RECURRENT THEMES

A number of important issues appear repeatedly throughout this book. This section identifies these issues. Watch for them as you read this book.

Information asymmetries Traders who know more about values and traders who know more about what other traders intend to do have a great advantage over those who do not. Well-informed traders profit at the expense of less-informed traders. Less-informed traders therefore try to avoid well-informed traders. Pay attention to who is well-informed and to how traders learn about values.

Options The option to trade is valuable. People who write limit orders give free trading options to other traders. Clever traders can extract the value of these options. Pay attention to when traders create trading options and to how they prevent other traders from extracting their values.

Externalities People create *positive externalities* when they do something that benefits other people without compensation. People create *negative externalities* when they do something that harms other people without penalty. The most important externality in market microstructure is the *order flow externality* Traders who offer to trade give other traders valuable options to trade for which the offerers are not compensated. The order flow externality attracts and binds traders to markets because they want to benefit from free trading options. Pay close attention to when, why, and how traders offer to trade. Also pay attention to how markets, brokerages, and dealers benefit from the order flow externality.

Market structure *Market structure* consists of the trading rules, the physical layout, the information presentation systems, and the information communication systems of a market. Market structure determines what traders can do and what they can know. It therefore affects trader strategies, the power relationships among different types of traders, and ultimately trader profitability. Always consider what effects market structures have on trading strategies and on the balance of power between various types of traders.

Competition with free entry and exit Traders compete in markets to make profits. Trading strategies that generate large profits attract traders who want to participate in those profits. Their entry lowers the profits that everyone makes, on average. Conversely, traders quit using trading strategies that are not profitable, which allows remaining traders to make more profits, on average. Free entry and exit ensures that alternative trading strate-

gies produce equal net profits, on average, after accounting for all costs. Wherever you see people competing, consider how the costs of entry and exit affect their ability to maintain profits or avoid losses. This principle will help you understand the determinants of bid/ask spreads, dealer profits, informed-trader profits, and order submission strategies.

Communications and computing technologies Markets are essentially information-processing mechanisms. They process information about who wants to trade, how much, and at what prices. The resulting prices aggregate information about fundamental values. The growth in information technologies has changed, and will continue to change, how people trade. Pay attention to the role of information-processing technologies in the markets.

Price correlations Markets for similar instruments are closely related. They tend to have similar conditions, and they often compete fiercely with each other for order flow. The order flow externality generally ensures that one market among a set of closely related markets will eventually dominate the others. Pay attention to markets that trade similar instruments and to the differences among them that make them unique. These issues affect how markets compete with each other.

Principal–agent problems Principal–agent problems arise when agents do what they want to do rather than what their principals want them to do. The most important principal–agent problem in market microstructure involves brokers and their clients. Brokers do not always do what you want them to do, and they may not work as hard on your behalf as you would. Pay close attention to how traders control their brokers.

Trustworthiness and creditworthiness People are *trustworthy* if they try to do what they say they will do. People are *creditworthy* if they can do what they say they will do. Since people often will not or cannot do what they promise, market institutions must be designed to effectively and inexpensively enforce contracts. Pay close attention to the mechanisms which ensure that traders will settle their trades. Attempts to solve trustworthiness and creditworthiness problems explain much of the structure of market institutions.

The zero-sum game All trades involve two or more parties. The accounting gains made by one side must equal the accounting losses suffered by the other side. Understanding the origins of trading profits therefore requires that we understand both sides of a trade. We must understand why traders on one side expect to profit, and why traders on the other side either are willing to lose or do not understand that they should expect to lose.

1.6 OUTLINE OF THE BOOK

The book is organized into seven parts. Part I examines the structure of trading. Several chapters describe how markets are organized and regulated, and how traders trade in them. Although much of the information is descriptive, the text also analyzes how various market structures affect trading strategies.

Part II considers what benefits markets produce for traders and for the wider economy. We must address these questions in order to judge whether the markets are working well. The first of the two chapters in this part of the book considers why people trade. The other chapter explains how markets benefit the whole economy. This chapter concludes with my opinion

about what markets should do and for whom they should do it. Your opinion may differ from mine.

To understand how trading rules affect traders, you must first understand how traders behave. The book therefore next devotes many chapters to understanding what various traders do. These chapters should be especially interesting to readers who want to become traders and to traders who want to improve their trading skills. Part III includes chapters that consider various speculative trading strategies. Part IV examines the traders who offer liquidity.

Part V contains two chapters that will help you to better understand the origins of liquidity and volatility. Both concepts are described in relation to the various trading strategies introduced in parts III and IV.

We consider the problems of evaluating trader performance in part VI. You must understand these issues if you intend to manage brokers, or if you want to know why index markets are so popular. These chapters lay the foundation for understanding who profits, and who loses, from trading. If you intend to trade for profit or invest your money with a money manager, the chapter on performance evaluation and prediction will be of great interest to you.

Finally, part VII concludes with several chapters that consider the economics of various market structures. These chapters examine how markets are organized, how they compete with each other, and how they respond to extreme volatility. These chapters will obviously interest regulators and exchange officials. They should also interest farsighted traders: Being able to predict how changes in rules, technologies, and competitive relationships affect markets distinguishes winning traders from losers.

Numerous sidebars appear throughout the book. These sidebars contain examples, stories, and historical explanations that illustrate and illuminate points made in the text. They are useful as mnemonic devices for remembering jargon and concepts. I beg your indulgence for the puns, wordplay, lighthearted jabs, and unsolicited opinions that appear in them.

I took the examples that appear throughout the book from all types of markets and from many different countries. A disproportionate number, however, involve equity trading in the United States because these markets are the best-known markets in the world. As noted above, most principles that apply to these markets also apply to all other markets.

Bulls and Bears

Traders call rising markets *bull markets* and falling markets *bear markets*. According to legend, these terms originated from morbid contests that promoters once staged between bulls and bears. Bulls fight by thrusting upward with their horns. In contrast, bears fight by striking downward with their claws. This image has generated a small cottage industry of artisans who create bull-fighting-bear sculptures that traders buy to adorn their offices and living rooms.

1.7 AN IMPORTANT DISCLAIMER

Traders often encounter significant legal and tax issues. Some types of trades are illegal, many trades create significant tax liabilities, and many commercial relationships in trading create important legal liabilities. If you trade, you must know the legal consequences of your actions.

The purpose of this book is to examine economic issues in trading, not legal issues. The text addresses many legal issues because legal issues often have significant economic implications for the markets, and because economic issues often are the basis for legal regulation. This book will help you to better understand the economic implications of laws that regulate securities, contracts, traders, and exchanges. It will also help you understand the economic bases for many regulations. It is not an authority for what the law is or for which laws you should pay attention to.

Do not rely upon this book for guidance on any legal issues. I am not a qualified legal adviser. Consult a qualified attorney when you must address legal questions.

1.8 SUMMARY

This book will help you understand the theory and practice of trading in exchange markets and dealer networks. When you master this subject, you will be able to trade more effectively, you will better appreciate the organization of our markets, and you will be able to form well-reasoned opinions about how the markets should be organized.

Markets have changed substantially during the last 100 years, and they will continue to change in the next 100 years. The current pace of change is fast, and is accelerating. By the time you read this, some specific descriptive information in this book will undoubtedly be dated. The economic principles governing markets and the traders in them, however, will remain the same. These concepts will help you understand all markets—past, present, and future.

2
Trading Stories

This chapter presents stories about how traders arrange routine trades in stocks, bonds, futures contracts, and currencies. If you are new to trading, you should read this chapter to help you appreciate the trading problems that people solve. If you are already quite familiar with trading, you also may want to read this chapter. Although these stories describe routine trades, they highlight difficult issues that traders confront when trading.

This chapter is full of institutional details. Do not worry if you do not understand all of them on your first reading. After you have finished reading this book, you will be able to understand these stories completely. For now, just read them to get a feel for what trading is about. The impressions that you form will help you appreciate the practical importance of the analyses that this book presents.

2.1 A RETAIL TRADE IN AN NYSE-LISTED STOCK

Jennifer wants to buy 200 shares of AT&T. She calls her retail broker, with whom she has already established an account. (Jennifer could also have used her broker's Internet-based order entry system.) Jennifer's broker might work for a full-service broker/dealer, such as Merrill Lynch; a national discount brokerage, such as Charles Schwab; or perhaps a local deep-discount brokerage, such as Brown & Company.

Jennifer provides the broker with her account number and identifies herself. She then asks for the current quotes for AT&T common stock. The broker looks at a screen on his desk that is similar to the Bridge Information Systems quotation display in figure 2-1. On the screen are the best bids and offers for AT&T that traders display in the Consolidated Quotation System. The quotes come from dealers at the New York Stock Exchange (NYSE), from dealers at several regional exchanges, from some independent NASD (National Association of Securities Dealers) members, and from some electronic communications networks (ECNs) that display limit orders that their clients have placed with them. The broker responds by quoting the best current prices at which traders can immediately buy or sell AT&T (ticker symbol "T") shares. Given the information in figure 2-1, the broker reports that the best (highest) bid for AT&T is for 19.83 dollars and the best (lowest) offer is at 19.85. The broker also tells Jennifer that the last trade in AT&T was at 19.84 dollars, which is down 0.10 from the previous day's close. Jennifer considers the quote. She then instructs her broker to buy the shares.

To convey her intentions, Jennifer will use either a market order or a limit order. A *market order* instructs the broker to buy at the best price available. A *limit order* instructs the broker to buy at the best price possible, but in no event to pay more than a *limit price* that Jennifer specifies. If Jennifer

```
us;T              AT and T Corp *#                                     Common Stock
+      19.84 DN       0.10   (N)  14.06   H          20     L         19.51 V 8,341,400

 E/MM   TIME       -BID-       SIZE(H)       E/MM   TIME        -ASK-      SIZE(H)
  (N)  14.06 +       19.83       6 dq        MADF  14.06          19.85     50
 CAES  14.06         19.83       1           CAES  14.06          19.85     50
  (T)  14.06 +       19.83       1            (T)  14.06          19.85     50
 TRIM  14.06         19.83       1            (C)  14.06          19.85      1
  (B)  14.04 +       19.80      30            (N)  14.06          19.86     33 dq
  (M)  14.06 +       19.73       1           ARCA  14.06          19.89      5
  (P)  14.01 +       19.72      20            (B)  14.04          19.94     30
 MADF  14.06         19.70       5            (M)  14.06          19.96      1
  (C)  14.06 -       19.70       1            (P)  14.01          19.98     20
 SBSH  14.00         19.69       1           TRIM  14.06          19.99      2
  (X)  14.06 +       19.58       1            NYD  12.24          20       500
  NYD  12.24         19.50     500            (X)  14.06          20.11      1
 SWST   9.42          9          1           SBSH  14.00          20.14      1
 ARCA  14.06          0.01       1           SWST   9.42          24.99      1

 OI BUY  :  LEHM    FBCO    GSCO    NATW    MLCO    SBSH    MONT
 OI SELL :  PRUS    UBSS    NATW    DLJP    SALB    RSSF    MONT

T/q    04-Oct-01 14:06 NYC                                            (c)BRIDGE
```

FIGURE 2-1.

A Bridge Information Systems Quotation Montage for NYSE-listed AT&T Common Stock

AT&T common stock (US ticker symbol T) last traded at 19.84, down 0.10 from the previous day's closing price. The trade occurred at the NYSE (N) at 14:06 Eastern Time when the high and low prices of the day were respectively 20 and 19.51, and 8,341,400 shares had already traded. The quotation montage consists of two sets of four columns each for bid and ask quotes. The first column identifies the quote maker. Exchanges have one or three letter symbols; dealer-brokers and electronic communications networks have four letter symbols. The quotation sizes are expressed as hundred-share lots. The rows are sorted so that the bids with the highest prices and asks with the lowest prices appear at the top of their respective columns. The first line of the montage shows that buyers at the NYSE were willing to buy at least a total of 600 shares for 19.83 while a dealer working for Madoff Investment Securities (MADF) was willing to sell at least 5,000 shares at 19.85. The two rows near the bottom present order indications (OI) that brokers and dealers have asked Bridge to display for Bridge clients. Bridge subscribers can query these firms to learn more about their orders.
Source: Reuters

uses a limit order, she will also specify when she wants the order to expire. For example, a *day order* will expire when the trading session ends.

Jennifer decides to submit a day limit order to buy 200 shares of AT&T, ticker symbol "T," for no more than 19.80 dollars per share. The broker enters Jennifer's order into his computerized order entry system. The system then confirms that Jennifer is authorized to make the trade. Next, the broker reads back the order to ensure that it is exactly what Jennifer intended. (The brokerage firm records telephone calls in case a dispute arises about what was said.) After Jennifer confirms the order, the broker releases it, and the order entry system sends it to an exchange or to a dealer.

Although AT&T trades primarily at the New York Stock Exchange, Jennifer's brokerage house might not send her order there. As figure 2-1 demonstrates, many other exchanges and dealers trade AT&T. The brokerage might send the order to a regional exchange or to a NASD dealer. Where the brokerage order system sends the order may depend on the prices

the various markets quote. It may also depend on cash payments and other nonmonetary inducements that dealers offer brokerages to obtain their order flow.

The brokerage's order entry system sends Jennifer's order to the NYSE by transferring it to the NYSE's SuperDot order-routing system. SuperDot then presents the order to the specialist who manages AT&T trading on the floor of the Exchange. The specialist will act as the floor broker for Jennifer's order. Jennifer's order appears on a workstation screen that the specialist rents from the Exchange.

The AT&T specialist is a trader who works for a member firm of the NYSE. He sometimes trades as a dealer for his firm's account and sometimes as a broker for his clients. The Exchange gives the specialist some special privileges and special responsibilities. The specialist receives all of the SuperDot order flow in AT&T. He organizes the AT&T trading to ensure that it is orderly, and he represents all orders entrusted to him. In return, the Exchange requires that he trade for his own account to fill customer market orders if no one else is willing to do so.

Since Jennifer's order is a limit order, the specialist first sees if anyone is interested in filling it immediately. No sellers are presently interested because other traders are bidding higher prices. The specialist then places her order in his electronic limit order book. Jennifer's order will stand in the book until the specialist can match it with someone who wants to sell at or below its limit price, until the order expires, or until Jennifer tells her broker to cancel it.

(If Jennifer submitted a market order instead of a limit order, the specialist would conduct an auction to find the trader willing to sell at the lowest price. A trader on the floor, a standing limit order in the order book, or the specialist himself might offer that price. If no one wants to fill the market order, the specialist will fill it himself by selling some of his own shares in AT&T to Jennifer.)

A few minutes after Jennifer enters her order, a large seller sends a market order through SuperDot. The specialist uses his computer to match this order with several orders including Jennifer's. The orders all trade at 19.80 dollars. The Exchange trading systems then report the trade to the Consolidated Trade Reporting System, which reports trade prices and sizes to various data vendors. These vendors immediately distribute trade reports throughout the world.

SuperDot also reports the trade to Jennifer's broker in a process called confirming the trade. The broker then reports the confirmation to Jennifer. If the order had been a market order, the time between the order entry and the final confirmation might have been less than half a minute. Jennifer might have received her trade confirmation during the same telephone call in which she placed her order. Since Jennifer's limit order took a while to trade, the broker phones Jennifer with the confirmation.

Jennifer now has to pay for her purchase. That day, the brokerage house mails her a written confirmation of the trade. The confirmation instructs her to pay the purchase price times 200 shares purchased plus the brokerage commission. If Jennifer trades through a deep discount brokerage, the commission may be as low as 15 dollars. It could have been even lower had she entered her order through the Internet.

Three business days later, the trade settles. Jennifer's brokerage pays for the stock, and the seller delivers it to her brokerage. If Jennifer has not yet paid for the stock, her brokerage will collect the money from any cash she holds in her account. If no cash is available and if Jennifer has executed a margin agreement, the brokerage will lend her the money and charge her interest on the amount due. The brokerage will use Jennifer's newly acquired AT&T stock and other securities in her account as collateral for the loan. If Jennifer does not pay, if she had no margin agreement with her brokerage, or if she does not have adequate collateral to support a new loan, the brokerage will eventually sell the stock and charge her for the commissions and for any losses incurred.

After Jennifer pays for her stock, the brokerage places the shares in her account. If she asks to have a stock certificate issued, her brokerage will instruct AT&T's transfer agent to issue the certificate and mail it to her. In that case, Jennifer should place the certificate in a safety deposit box for safekeeping.

2.2 A RETAIL TRADE IN A NASDAQ STOCK

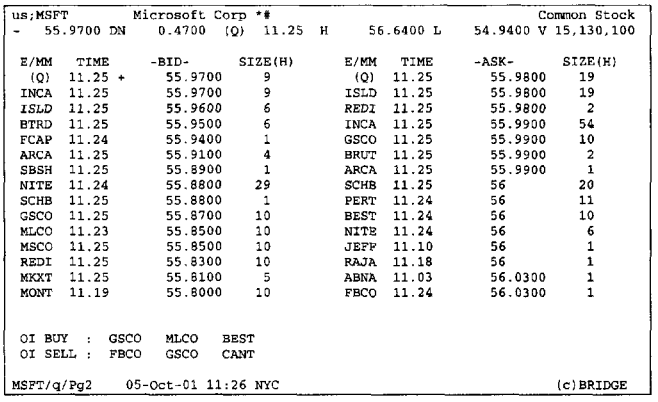
Jennifer now wants to sell 100 shares that she holds in Microsoft. Unlike AT&T, Microsoft does not trade at traditional stock exchanges like the NYSE. Instead, about 40 independent dealers who publish their quotes in the Nasdaq National Market System trade Microsoft. The dealers sit at their desks throughout the country and enter their quotes into Nasdaq workstations that are linked through a private network.

When Jennifer asks her broker for a quote, the broker pulls up a screen on his desk that is similar to the Bridge Information System display in figure 2-2. This display ranks the bids and offers of the 39 Nasdaq market makers and electronic communications networks that were providing quotes in Microsoft on October 5, 2001, at 11:26 Eastern Time. The bids are ranked from highest to lowest, and the offers (asks) are ranked from lowest to highest. Looking at this screen, the broker reports that Microsoft (MSFT) last traded at 55.97, down 0.47 from the previous close; the market is currently 55.97 bid; 55.98 offered.

With this information, Jennifer instructs her broker to sell 100 shares of Microsoft at the market. This instruction tells the broker that she wants the order filled quickly, at the best price available.

The broker then asks Jennifer whether she owns the shares of Microsoft that she intends to sell. He needs to know where the shares will come from in order to settle the trade. Jennifer tells the broker that she owns the shares. If Jennifer did not own the shares, she would be selling the stock short. To settle the trade, Jennifer would have to borrow 100 shares from someone. Since borrowing shares is sometimes difficult or impossible, the broker would have to arrange to borrow the shares before Jennifer could sell them.

The broker enters Jennifer's order into his order entry system and reads it back to her. When Jennifer confirms the order, he releases it. If the brokerage firm does not deal in Microsoft, its order entry system will send the order to the Nasdaq Small Order Execution System (SuperSoes). If the brokerage has a trader who is a Nasdaq dealer in Microsoft, the broker will probably send the order to that trader.



```
us;MSFT          Microsoft Corp *#                                    Common Stock
-   55.9700 DN     0.4700  (Q)  11.25  H     56.6400 L    54.9400 V 15,130,100

 E/MM   TIME      -BID-      SIZE(H)      E/MM   TIME      -ASK-      SIZE(H)
  (Q)  11.25 +    55.9700      9          (Q)  11.25      55.9800      19
 INCA  11.25      55.9700      9         ISLD  11.25      55.9800      19
 ISLD  11.25      55.9600      6         REDI  11.25      55.9800       2
 BTRD  11.25      55.9500      6         INCA  11.25      55.9900      54
 FCAP  11.24      55.9400      1         GSCO  11.25      55.9900      10
 ARCA  11.25      55.9100      4         BRUT  11.25      55.9900       2
 SBSH  11.25      55.8900      1         ARCA  11.25      55.9900       1
 NITE  11.24      55.8800     29         SCHB  11.25      56           20
 SCHB  11.25      55.8800      1         PERT  11.24      56           11
 GSCO  11.25      55.8700     10         BEST  11.24      56           10
 MLCO  11.23      55.8500     10         NITE  11.24      56            6
 MSCO  11.25      55.8500     10         JEFF  11.10      56            1
 REDI  11.25      55.8300     10         RAJA  11.18      56            1
 MKXT  11.25      55.8100      5         ABNA  11.03      56.0300       1
 MONT  11.19      55.8000     10         FBCO  11.24      56.0300       1


 OI BUY  :  GSCO   MLCO   BEST
 OI SELL :  FBCO   GSCO   CANT

MSFT/q/Pg2     05-Oct-01 11:26 NYC                                  (c)BRIDGE
```

FIGURE 2-2.
Page 1 of a Nasdaq Level II Quotation Montage for Microsoft Common Stock
Source: Reuters

SuperSoes routes the order to one of the Nasdaq dealers. Jennifer's brokerage, like most other retail brokerages, specifies the dealer to which SuperSoes sends her order. If the brokerage did not specify a dealer, SuperSoes would have sent the sell order to one of the dealers displaying the best (highest) bid. Her brokerage specifies a particular dealer because that dealer has arranged to give the brokerage a cash payment or some nonmonetary inducement to obtain her order.

The dealer who receives Jennifer's order executes it by buying the stock for his own account. Many dealers have computer systems that automatically execute small market orders when they arrive. The trade price will be at least 55.97 dollars (assuming that the best bid has not changed). Even if the dealer is not presently quoting a bid of 55.97, he will match that price.

After the dealer fills the order, he reports the trade to Jennifer's broker and to Nasdaq. The broker then confirms the trade to Jennifer by phone and by mail. If the brokerage does not already hold Jennifer's shares, the broker will ask Jennifer to deposit her certificates in her brokerage account. Nasdaq forwards the trade report to various data vendors, who report it to the public.

The trade settles three business days later. At that time, the brokerage delivers the 100 shares of Microsoft to the dealer, and the dealer pays for them. The brokerage credits Jennifer's account with the proceeds of the sale, less any commission charged and a small fee that the Securities and Exchange Commission collects from sellers of securities.

2.3 AN INSTITUTIONAL TRADE IN A NYSE STOCK

Bob is a trader who works for Rocket Science Investment Management (RSIM), a (fictitious) investment management firm that manages money for several corporate pension funds. These pension funds have each given RSIM authority to trade on their behalf. RSIM manages a total of 2 billion dollars, invested primarily in U.S. equities.

At 12:30 P.M., Eastern Time, an RSIM portfolio manager asks Bob to buy 400,000 shares of Exxon Mobil Corporation for their clients. Since the price of Exxon Mobil is near 40 dollars, the principal value of the trade is about 16 million dollars. This makes it a large trade, but not especially so. On October 4, 2001, this trade would have represented only 0.006 percent of the total number of shares outstanding in Exxon Mobil (6.87 billion), 0.8 percent of the firm's portfolio, and 5 percent of the average daily volume (about 9 million shares) in Exxon Mobil. Bob's job is to get this order filled at the lowest possible cost.

Bob first asks the portfolio manager why he wants to buy the stock. If the manager wants the stock because he suspects that Exxon Mobil will very soon announce the discovery of new reserves, Bob must trade quickly. The price will rise as others come to the same opinion, and it will surely rise when Exxon Mobil makes its announcement. In contrast, if the manager wants to buy the stock because he believes that it is fundamentally undervalued, Bob can be more patient. The prices of such stocks usually do not rise so quickly that Bob needs to hurry to trade. The portfolio manager says that he wants to buy Exxon Mobil because he believes it is fundamentally undervalued.

Bob then uses an electronic information retrieval system to examine the recent price and trade history for Exxon Mobil. He looks to see whether other traders are trying to fill large orders. If a large seller is pushing prices down, Bob might be able to fill his order quickly at a good price. If Bob must compete with another large buyer, the order may be hard to execute at a good price. Falling prices often indicate that large buys will be easier to fill than large sells. Rising prices may indicate the opposite. Since movements in the price of Exxon Mobil closely correlate with movements in the market as a whole, Bob also compares Exxon Mobil's recent price history against movements in the S&P 500, which is a broad market index. If Exxon Mobil is unchanged, but the market is down, Bob's purchase may be easier to arrange on good terms than if the market is up. Bob finds that Exxon Mobil is down slightly while the market is largely unchanged.

Bob next tries to discover whether there is any large trader interest in Exxon Mobil. He consults one or more of the electronic information systems that collect information about trader interests. Bridge, Liquidnet, Autex, and Instinet are among the more important systems. These systems show that several traders have indicated interest in Exxon Mobil. Bob cannot tell from the screen how serious they are, or whether they have already filled their orders. One of the traders is a Morgan Stanley broker.

Bob calls one of the many brokers with whom RSIM does business. He chooses a floor broker whom he trusts to keep quiet, since he does not yet want to reveal that he is in the market. Without stating his intentions, he asks the broker, who happens to work for Merrill Lynch, what market conditions are like in Exxon Mobil. The Merrill floor broker goes to the post where Exxon Mobil trades on the NYSE floor and tries to collect some useful information. He may stand around watching the trading, or he may ask the specialist and other nearby traders who has been interested in trading. They may or may not tell him what he wants to know, and they may not answer with complete honesty. Traders generally will not reveal their interest without some indication that they are revealing to someone who is able and willing to trade with them on the spot. The Merrill Lynch broker re-

ports to Bob that no large trader interest is currently visible in the stock. He also says that the Morgan Stanley broker was actively selling earlier in the day.

At 12:50 P.M., Bob sends an order to buy 400,000 shares in Exxon Mobil to POSIT. POSIT (POrtfolio System for Institutional Trading) is an electronic trading system run by Investment Technology Group. POSIT collects buy and sell orders from large, primarily institutional traders and attempts to match them. The service is completely confidential. It does not reveal any information about orders to anyone. Bob sends his order directly to POSIT, using software it provides.

Eight times daily—at 9:40 A.M., 10 A.M., 10:30 A.M. and hourly from 11 A.M. to 3 P.M. Eastern Time, POSIT conducts crosses to match buyers with sellers. If the total POSIT buy order volume exceeds the total POSIT sell order volume, the sell orders are all filled completely, and the buy orders are partially filled. The fraction filled depends on the extent to which buy order volume exceeds sell order volume. If buy order volume is twice the sell order volume, POSIT will fill half the total volume of all buy orders. The actual fill rate for any given order depends on a complex set of rules that POSIT uses to best serve the needs of its clients. A similar set of matching rules applies if sell order volume exceeds buy order volume.

POSIT assigns the trade price by choosing a time at random within the seven minutes that immediately follow the cross. At that time, POSIT computes the average of the bid and ask in the primary market for the stock. POSIT uses that average as the trade price for all crossed orders. As soon as the cross is completed, POSIT reports the trades to its clients and to the NASD.

At 1:10 P.M., Bob learns that 48,000 shares of his 400,000-share order filled at a price of 39.84 dollars. From this information, Bob knows only that POSIT buy order volume exceeded POSIT sell order volume. He can roughly infer the size of the unfilled POSIT buy order volume from the total size of the cross, which he can read off the Consolidated Tape. (The POSIT report appears on the tape with an exchange marker of "O," which indicates third market trades.) If the cross were for 48,000 shares, Bob would know that he was the only buyer. If the cross was for 100,000 shares, he could roughly infer that the total POSIT buy order volume was a bit more than 800,000 shares because the 48,000-share partial fill on his 400,000-share order represented about half of trade volume. The estimate is rough because POSIT does not use a strict pro rata rationing algorithm to match the orders. After consulting trade records reported to the electronic Consolidated Trade Reporting System, Bob concludes that his order was probably the only large buy order in POSIT.

Bob then calls a sales trader at Morgan Stanley, with which his firm has an account, to inquire about the posted indication he had seen earlier. This broker sits at Morgan Stanley's equity trading desk on the trading floor at Morgan Stanley's headquarters in midtown Manhattan. The broker says that he has already filled his client's sell order and apologizes for failing to remove the indication. The broker then suggests that his client may be willing to sell more. Bob expresses some interest, and the broker calls his other client while putting Bob on hold. A negotiation takes place through the broker's intermediation. In the end, the broker arranges a trade for 200,000 shares at 39.87.

The sales trader then telephones a Morgan Stanley floor broker at the NYSE and asks him to print the trade. The floor trader goes to the Exxon Mobil post and tells the specialist that he would like to cross a block of 200,000 shares at 39.87. The specialist is currently quoting a market of 38.86 bid and 39.88 asked, and the last trade was at 39.86. The specialist gives his approval. (If the proposed trade price were higher than 39.88, the specialist would have required the floor broker to allow the sell orders standing in the limit order book below that price to participate in the trade.) The specialist reports the trade to an Exchange computer that forwards it to the Consolidated Trade Reporting System.

At the same time, other traders standing at the post ask the Morgan Stanley floor broker whether there is more interest on either side of the trade. The broker says that he will call to find out. He calls his trading desk, and the sales trader calls Bob.

Just before Bob gets this call, he receives a call from the Merrill Lynch floor broker with whom he had earlier spoken. The broker reports that Morgan Stanley just crossed 200,000 shares. Bob tells him that he was the buyer. Bob then gives the Merrill Lynch broker a market-not-held buy order for 80,000 shares. The market-not-held instruction tells the floor broker to buy shares at his discretion. When Bob gets the call from the Morgan Stanley sales trader, he says that he is no longer actively interested in the stock.

The Merrill broker now stands in the crowd and waits to see what happens. In the next hour, he buys 20,000 shares at 39.88, 32,000 shares at 39.90, and 28,000 shares at 39.95. He calls Bob back with the confirmations.

Bob then gives the Merrill broker a market-not-held order to buy the remaining 72,000 shares. The specialist's quote is now 39.95 bid, good for 240 round lots of 100 shares (24,000 shares) and 40.00 offered, good for 500 round lots. Before the floor broker arranges any more trades, the broad market starts to rise. The Merrill broker looks at the S&P 500 futures contract price and sees that it has risen faster than the S&P 500 Index, so that the spread between the future price and the index has widened. This evidence suggests that the stock market may continue rising. It also suggests that index arbitrageurs may soon start buying Exxon Mobil, which is the largest stock in the S&P 500 Index. The Merrill broker turns to the specialist and immediately asks to buy 72,000 shares for 40.00. The specialist, acting as broker for several traders whose sell limit orders are on the book at 40.00, sells him the shares and reports the trades. The specialist then raises his bid and offer, and the Merrill broker calls Bob to report his trades.

Bob has now completely filled his 400,000-share order. The average cost of his trades was 39.898 dollars per share, not counting commissions. Bob reports the trades to his firm's back office, which will arrange settlement. He also reports the trades to the portfolio manager. A summary of these trades appears in table 2-1.

Bob's firm, RSIM, will not actually purchase the shares that Bob bought. Instead, RSIM's pension fund clients will purchase and hold the shares. The back office must now tell the custodians of these funds that RSIM made purchases on their behalf. RSIM divides the 400,000 shares among the various pension funds in proportion to the money that they have placed under

TABLE 2-1.
Summary of Bob's Trades

SHARES	PRICE	NOTES
48,000	39.84	POSIT
200,000	39.87	Morgan Stanley block trade
20,000	39.88	Merrill Lynch floor trades
32,000	39.90	Merrill Lynch floor trades
28,000	39.95	Merrill Lynch floor trades
72,000	40.00	Merrill Lynch trades with book
400,000		

management at RSIM. Three days later, the various pension fund custodians will pay for and receive their Exxon Mobil shares. Each will pay the same price per share.

2.4 AN INSTITUTIONAL TRADE IN A NASDAQ STOCK

Bob's portfolio manager now asks him to sell 10,000 shares in United States Lime & Minerals (USLM), a Texas-based producer of pulverized limestone, quicklime, and hydrated lime products. USLM trades at about 4.85 dollars per share, so the principal value of this transaction is 48,500 dollars. Although the order represents only 0.17 percent of the total shares outstanding (about 6 million), it is about ten times bigger than the average daily volume in USLM. Bob expects that his order will be difficult to fill.

Bob calls up the USLM Nasdaq quote montage using Bridge Information Systems (figure 2-3). Only three dealers are actively making a market in USLM. The best bid is 4.85 and the best offer is 4.90, so that the bid/ask spread is 1 percent of price, which is quite wide. Moreover, the total displayed size on the bid side of the market is only 500 shares. As of 11:32 Eastern Time, the stock has not yet traded. The fact that the stock has not yet traded, the wide spread, and the small displayed size all suggest that the order will be expensive to fill.

Bob picks up the phone and calls Spear, Leeds, Kellogg and Co. (SLKC). SLKC is a very large dealer that is making a market in USLM. He chooses SLKC because the firm has provided him good service in the past. SLKC is not bidding the most aggressive price, but it is not far from the market. He also notes that SLKC's offer is way behind the market, which suggests that SLKC has no interest in being a buyer. Bob generally assumes that the dealers bidding the most in Nasdaq are the most eager to buy, although he knows that this is not always the case.

When the SLKC dealer answers the phone, Bob asks him for quotes to buy or sell 10,000 shares of USLM. He asks for both sides because he does not yet want to reveal that he is a seller. If Bob had said that he wants to sell, the dealer might have been tempted to lower his quote. Since the dealer does not know whether Bob is a buyer or seller, he is more likely to quote prices that fairly reflect his best estimate of value of the stock.

```
us;USLM        United States Lime and Minerals Inc              Common Stock
-    4.9000 UNCH    (Q)  1 DNT  H      0      L      0      V 0

 E/MM   TIME      -BID-       SIZE(H)      E/MM   TIME      -ASK-       SIZE(H)
  (Q)  10.36 +      4.8500       3          (Q)  10.36      4.9000       12
 HRZG   9.31        4.8500       3         LEGG  10.36      4.9000       12
 SLKC   8.35        4.7800       1         HRZG   9.31      5.5000        1
 LEGG  10.36        4.4000       1         SLKC   8.35      6.6200        1




 OI BUY  :
 OI SELL :

USLM/Q    05-Oct-01  11:32 NYC                                    (c) BRIDGE
```

FIGURE 2-3.
Nasdaq Level II Quotation Montage for United States Lime and Minerals
Source: Reuters

Before quoting, the dealer looks at the Nasdaq market and confirms that no recent news stories have appeared about USLM. The dealer wants to make sure that Bob does not know something important about the stock that he does not.

Although SLKC's Nasdaq quote is 4.78 bid, 6.62 offered for 100 shares, he gives Bob a quote of 4.70 bid, 5.05 offered for 10,000 shares. Bob then asks whether the dealer will pay 4.75 for 10,000. The dealer accepts the offer and buys 10,000 shares from Bob. The dealer must report the trade to Nasdaq within 90 seconds. Bob reports the trade to his back office, which notifies the custodians of the various pension plans for which RSIM provides investment management.

2.5 A VERY LARGE BLOCK STOCK TRADE

Until the day of his death last year, John Smithson was the chairman and principal stockholder in Smithsonian Industries, a (fictitious) firm that trades at the NYSE. Smithson founded the firm 55 years earlier with two friends whom he subsequently bought out. He was its CEO until five years ago, when he decided to go into semiretirement.

Over the years, Smithsonian Industries financed its extraordinary growth through a series of secondary stock offerings and convertible debt offerings. The firm also made some acquisitions that it financed by swapping stock. Although these transactions substantially reduced the fraction of shares that Smithson owned, upon his death he still owned 4 percent of the common stock. Various institutions owned another 54 percent of the stock. Management owned less than 2 percent. Private shareholders held the remaining 40 percent. The firm currently has 40 million shares outstanding. At the current price of 80 dollars a share, the firm has a total capitalization of 3.2 billion dollars.

Smithson was always disappointed that his children never showed any interest in the business. He therefore left all of his 1.6 million shares in Smithsonian to Edna Wilkerson, his only grandchild and the darling of his golden years. He also appointed her executrix of his estate.

Edna hired a financial adviser, who told her that she would have to borrow money or sell shares in Smithsonian to pay inheritance taxes. He also suggested that she should sell shares in Smithsonian to diversify her port-

folio. Edna then spoke to the Smithsonian CEO and explained her problem. The CEO, who was now also the newly appointed chairman, suggested that Edna contact Goldman Sachs. Goldman had managed the last two secondary offerings made by the firm.

Edna spoke to brokers in the private client services group at Goldman Sachs and arranged for them to sell 900,000 shares of Smithsonian Industries. The brokers suggested that she sell all 1.6 million shares. Edna was reluctant, however, because of a sense of loyalty to her grandfather and because she felt her grandfather had picked an excellent successor.

The private client services brokers then passed the order to brokers on Goldman's block brokerage desk. These brokers now have to find buyers for 900,000 shares of stock. Since daily trading volume in the stock is averaging only 60,000 shares, they are unlikely to find the buyers on the floor of the exchange. They will have to find them elsewhere.

Goldman's block brokers face the following predicament. If nobody knows that they have stock to sell, they will not be able to sell it. However, if too many people know that a large block of stock is hanging over the market, speculators will push the price down. The Goldman brokers thus must be selective when approaching potential buyers.

Before contacting anyone, the brokers do some research to determine who will most likely be interested in buying the stock. They first draw up a list of their clients who have shown recent interest in Smithsonian Industries. They then examine the CDA/Spectrum database to see what institutions currently own Smithsonian and which ones have been increasing their positions in that stock. Various classes of investors have to make quarterly reports of their positions to the Securities and Exchange Commission. CDA/Spectrum collects these publicly available 13F Holdings Reports, sorts the positions by stock, and publishes the information in an electronic database. The brokers access this information through computers on their desks. The brokers also try to identify large funds for which an investment in Smithsonian Industries would make strategic sense. When their research is complete, the brokers rank potential buyers by their likely interest in the trade and by the likelihood that they will trade on the information revealed to them.

The Goldman block brokers then start contacting potential buyers and try to sell the stock. The current NYSE quote for Smithsonian Industries is 81.00 bid, 81.15 offered.

Traders who show interest in the block all ask the same questions. They want to know who the seller is, and why he or she is selling. In particular, they want to know that Edna is not selling the stock because she believes that it is overvalued. The brokers explain that Edna must sell the stock to raise money to pay inheritance taxes. They add that Edna has no other assets that she could sell to raise the money. Traders also want to know the discount at which the brokers will price the block to sell it. The brokers must offer a discount to encourage the buyers to participate. The brokers estimate that the discount will be 1.50 dollars. Finally, the potential buyers want to know whether Edna is selling her entire holdings of Smithsonian Industries. In particular, they want to know whether Edna will offer more stock after she sells this block. If she does, the next block probably will further depress prices. The traders who purchase the first block will see an immediate loss on their investment. The brokers explain that Edna is not

offering all her stock, despite their encouragement to do so. Although they cannot guarantee that she will not offer more stock later, they do not expect her to do it soon. In an effort to put a positive spin on this information, they argue that her reluctance to sell more of the stock suggests that she thinks it is undervalued.

The brokers continue contacting potential buyers until they have identified sufficient commitments to complete the transaction at a reasonable price. After contacting 10 potential buyers in 15 minutes, the Goldman Sachs brokers obtain firm commitments from three buyers who are willing to buy a total of 850,000 shares at 80 dollars per share. The brokers then call one of their floor brokers and ask him to print the trade.

The Goldman Sachs floor broker approaches the post and observes that the current quote has dropped to 80.75 bid, 81.00 offered, even though the broad market has risen slightly. He then asks the traders there whether anybody wants to buy Smithsonian Industries. A First Boston floor broker indicates that she is interested. The Goldman broker asks how much she wants to buy. She says 10,000 shares. He then asks whether that will fill her order. She answers yes. The Goldman floor broker then tells the specialist that he wants to print a block of 900,000 shares at 80. The specialist consults his limit order book and says that there are buy limit orders totaling 20,000 shares on his book at prices between 80.00 and 80.75. He also indicates that he is interested in buying 5,000 shares for his own account. The limit orders and the First Boston buy order have precedence over the three primary buyers of the block. They must be filled if the price drops to 80. The Goldman trader agrees to allow the limit orders, the First Boston order, and the specialist to participate in the block trade at 80. Goldman Sachs purchases the remaining 15,000 shares for its own account.

Everybody involved starts making reports. The specialist reports the trade to the exchange information systems. The Goldman broker calls his block trading desk and tells them that he had to include 35,000 shares from the floor in the trade. The block desk calls Edna and the three primary purchasers with their confirmations. The First Boston broker calls her client with her report. The specialist has SuperDot report confirmations for the limit orders that brokers entered into the book through SuperDot. He asks his assistant to page two floor brokers who gave him limit orders to hold in his book. When they call in, the assistant gives them their confirmations. Within a few minutes, a market commentator on CNBC reports that Smithsonian Industries is down a dollar and 25 cents for the day following a 900,000-share block that just crossed the tape.

2.6 SOME CASH COMMODITY AND ASSOCIATED FUTURES MARKET TRADES

Moline Meal (MM) is a (fictitious) soybean processor located on the Mississippi River in Moline, Illinois. Moline is on the Iowa-Illinois border about 150 miles west of Chicago, in the heart of soybean country at the junction of interstate highways 75 and 80. Several railroads pass through the city.

MM buys soybeans from farmers up and down the river and from both sides of the river. It crushes most of the beans to separate the oil from the meal. MM sells the oil to food processors and the meal to feedlot operators.

Low margins, high volumes, and volatile prices characterize the business. Prices are volatile because weather conditions make harvests unpredictable and because the demand for meat (and hence for soy meal for feed) fluctuates with the business cycle. To manage the risk in its business, MM hedges extensively in the Chicago soybean futures markets.

The Chicago Board of Trade (CBOT) has three soybean contracts: a bean contract, an oil contract, and a meal contract. The bean contract calls for the delivery of 5,000 bushels of beans, or slightly more than 1.5 standard railroad carloads (each of which holds approximately 3,300 bushels). The oil contract calls for the delivery of 60,000 pounds of oil, and the meal contract calls for the delivery of 100 tons of meal. These quantities are approximately the amount of oil and meal that millers produce when they crush 5,000 bushels of beans.

Sellers must deliver the beans in Chicago when the contracts expire. Contracts for eight delivery months are traded. The delivery months are November, January, March, May, July, August, and September. Trading in each contract starts about a year before it expires.

On the morning of October 12, an MM trader speaks by phone with the representative of a local farmers cooperative. He negotiates a purchase of 150 carloads of beans from the cooperative. The farmers will deliver the beans in December, following the harvest, and MM then will pay for them. After specifying grade, quality, and delivery terms (most of which are standardized), the traders turn their attention to the price.

By custom, they express cash soybean prices relative to the price of the Chicago futures contract nearest to expiration. The negotiators therefore discuss only the local price differential, which traders call the basis. After a few offers and counteroffers, the traders agree to a basis of −5 cents. When the farmers deliver their beans, the price they will receive will be 5 cents less than the then current January futures contract price.

MM does not yet have buyers for the beans or for the meal and oil that they will probably press from them. If the price of beans drops after MM pays for them, but before MM sells the beans or their pressed products, MM will lose money. If the price rises, MM will make money. Although on average MM will probably break even, MM management is uncomfortable with the price risk and does not want the firm to pay the costs of financing large, unpredictable cash flows.

Management also is concerned that its traders may inadvertently place the firm into speculative positions in soybeans. To reduce these risks, MM has a risk management program. Unless specifically exempted, MM requires that all its traders must always hedge their exposed positions.

Until MM takes delivery on the beans and pays for them, it is not exposed to price risk. If the price of beans rises, it will pay more for more valuable beans. If it falls, it will pay less for less valuable beans. After MM takes delivery, MM will be very exposed to price risk.

To hedge this risk, the MM risk manager will hold an offsetting short futures position in the January soybean futures contract. The risk manager needs 99 futures contracts (150 carloads × 3,300 bushels per carload ÷ 5,000 bushels per contract) to hedge the price risk. To minimize the exposure of the firm to price risk, the risk manager must construct this position when MM takes delivery of the beans.

Immediately following the trade, the MM trader calls the MM risk manager and reports that he just arranged to buy 150 carloads of December soybeans. The trader also reports that the cooperative will exchange a January short position of only 50 contracts with the beans in a transaction known as an *exchange for physical* in the futures markets and as a *cash exchange* in the grain trade. (This transaction is unusual because the cooperative normally would exchange a 99-contract short position rather than just a 50-contract position.) The risk manager therefore will have to sell 49 additional contracts upon delivery.

When MM takes delivery in December, the risk management officer calls a broker who works for Iowa-Illinois Investor Services (IIIS), a (fictitious) futures commission merchant. IIIS is one of many futures brokerages with which MM maintains an account. The risk manager identifies himself and instructs the broker to sell 49 January soybean futures contracts at the market. The broker enters the order into a computer, repeats it, and obtains his client's confirmation. The risk manager also instructs the broker to do an exchange of 50 contracts with the cooperative's broker.

The broker sends the market sell order to the CBOT trading floor, where it prints on an "Electronic Clerk" printer in the soybean pit. A IIIS clerk immediately picks up the order and gives it to the IIIS floor trader.

The pit is a structure on the floor of the exchange in which the traders stand. The inside looks like a miniature football stadium. The bottom is flat. The sides are terraced with steps that go all the way around the pit. The traders stand shoulder to shoulder on the bottom and on the steps. This design makes it easier for everyone to see everyone else. Above and to the side of the pit is a podium on which exchange price reporters stand. They watch the trading in the pit and immediately report trade prices as traders make them. Surrounding the pit are large screens that display the most recent trade prices to the trading crowd. About 200 traders fill the soybean futures pit. The CBOT has about 20 different trading pits on its main trading floor.

The traders are a diverse set of people. Each trader has a seat on the exchange. Some own their seat; some lease it; some use a seat provided by their employer. Most traders are locals, and most locals are scalpers and day traders. Locals are typically one-person operations. Scalpers are dealers who buy and sell for their own account. They try not to hold large positions for more than a few minutes. They are continuously acquiring and unwinding their positions. Day traders are speculators who may be willing to hold positions through the trading session but rarely overnight. Some scalpers and day traders also act as brokers for other traders. The remaining traders are brokers who work either for themselves or for large national firms.

The traders all wear large identification badges that can be seen from across the pit. Most also wear distinctive jackets, often with wild color schemes, to make them easier to find. The jackets have large outside pockets for holding papers. The traders all have a pencil in one hand and a trade card in the other hand. Increasingly, some traders carry handheld trade reporting devices that transmit trades as they record them.

The IIIS clerk finds her floor trader, Jack, by looking for his yellow jacket with two-inch pink polka dots in the place where he normally stands. She gives Jack MM's sell order. Jack reads it with a well-practiced poker face and then sticks it into a pocket.

Traders communicate in the pit by shouting and using hand signals. They shout out their bids and offers so that everyone can hear what they say. The noise can be so great that few traders actually hear what they say, though many can read lips well. Traders therefore also use hand signals to make their bids and offers. They use fingers to indicate prices and sizes. The orientation of the hand (up or sideways) shows whether they are expressing prices or quantities. Hand orientation also shows whether the trader wants to buy or sell: Palm out indicates an offer to sell; palm in indicates a bid from a buyer. By using both voice and hand signals, the traders reduce the chance that they will misunderstand each other.

Traders arrange trades by accepting another trader's bid or offer. Traders yell "sold" to accept a trader's bid or offer. The acceptor also points at the other trader to get his or her attention and to make eye contact. The traders then negotiate the size of the trade.

The IIIS trader thus has two ways that he can arrange to sell soybeans for MM. Jack can offer the beans for sale and hope that a buyer will accept the price. Alternatively, he can wait until a buyer bids and then accept the buyer's price.

When Jack receives the order, the last reported trade price was $678\frac{3}{4}$. Some traders are bidding $678\frac{3}{4}$ cents and others are offering at 679 cents. Jack's trader accepts the bids from two traders at $678\frac{3}{4}$ cents and negotiates to sell three contracts with one and four contracts with another. He quickly writes the terms of the two trades and the two trader IDs on his trade card. The two traders do likewise. Jack then shouts an offer for $678\frac{1}{2}$ cents, but no one takes it. After about five seconds, he lowers his offer to $678\frac{1}{4}$ cents, and still receives no interest. Some traders bid for $677\frac{3}{4}$. He lowers his offer to 678, and three traders take his offer. Jack negotiates to sell the remaining 42 contracts at 678, and the four traders record their trades.

Jack then reports the trades to his clerk. The clerk calls the Moline office with the confirmation, and the broker there then calls MM's risk manager. After reporting the trade, the broker tells the risk manager that MM must post 198,000 dollars in margin to guarantee its performance should the price of soybeans rise. The risk manager posts the margin by transferring Treasury bills worth 200,000 dollars to this account.

Shortly after the 1:15 P.M. (Central Time) close of trading, the final settlement price for the December soybean contract is set at the closing price of $684\frac{1}{4}$ cents. Since MM is short 99 soybean contracts sold at an average price of 678.25 cents, MM has lost 6 cents per bushel on its new position. The total dollar loss is 6 cents per bushel times 5,000 bushels per contract times 150 contracts, or 45,000 dollars. MM transfers this amount to IIIS that afternoon.

None of the traders with whom Jack traded knows Jack's order came from MM. Jack likewise does not know whether the traders with whom he traded were trading for their own accounts or for others.

At the end of the trading session, Jack submits a list of all his trades to the Board of Trade Clearing Corporation (BOTCC). The BOTCC takes Jack's trade reports and those of all other traders, and attempts to match the buys with the sells. A trade clears when two traders both report that they traded the same quantity with each other at the same price. About 95 per-

cent of all trade reports clear without problem. The remaining reports are called out-trades. The BOTCC returns these reports to the traders, who must resolve the discrepancies among themselves. Transcription errors generally cause most out-trades. Occasionally they result from misunderstandings. On very rare occasions, out-trades are due to fraudulent reports. The traders must resolve their out-trades before trading starts the next day.

The BOTCC guarantees all trades. Although traders negotiate their contracts with each other, their contracts are actually commitments to the BOTCC. BOTCC thus acts as the buyer for each seller and the seller for each buyer. This arrangement ensures that traders do not need to decide whether another trader is creditworthy before they trade. The clearing members of the CBOT and the MidAmerica Commodity Exchange own the BOTCC. If one of the members defaults, the others bear the resulting losses. To reduce the potential losses, the BOTCC requires that its members post and maintain margin (performance bonds) for each contract they clear.

2.7 AN OPTIONS MARKET TRADE

Lisa holds 2,000 shares of Microsoft stock, which is currently trading for 55 dollars per share. The stock has risen greatly in value since she bought it in 1993 for the split-adjusted equivalent of 5 dollars per share. If she sold it today, she would realize a capital gain of 50 dollars per share and would have to pay a substantial capital gains tax. Lisa now thinks that Microsoft is overvalued, but she is not certain. If it drops in value, she would like to sell her position at today's prices and, if possible, defer the capital gain for a few months to move it into the next tax year. If the price rises, she would like to keep the stock and continue deferring her substantial tax liability.

To achieve her investment goals, Lisa decides to buy 20 Microsoft January 55 put option contracts. Each of these contracts gives her the option to sell 100 shares of Microsoft at 55 dollars per share any time before or on the third Friday in January. If the price of Microsoft rises before then, she will make money on her Microsoft stocks. The options will lose their value, however, and she will not exercise them. If the price of Microsoft falls, the options will become quite valuable, and her loss in her Microsoft stock will be offset, almost one for one, by her gains on the options. In that case, Lisa will decide in January to realize the gains on the options by selling them or by exercising them. If she sells the options, she will pay the capital gains tax on their increase in value at her short-term combined federal and state rate of 44 percent. If she exercises them and sells her Microsoft stock for 55 dollars per share, she will pay the tax on her capital gain at the long-term rate of 26 percent. Although the capital gain will be larger in the stock than in the options, she may sell the options rather than exercise them because of the higher short-term capital gains rate of 44 percent. In either case, she will have deferred the capital gain into the next year.

Lisa calls her securities brokerage, with which she has set up an account with options trading privileges. To obtain these privileges, Lisa had to convince a senior registered options principal at the brokerage that she understands how options work and the risks to which they can expose her. She also had to demonstrate to the principal's satisfaction that she is financially able to withstand the potential losses that can be associated with options

trading. The Securities and Exchange Commission, the Options Clearing Corporation (OCC), and the brokerage impose these suitability requirements upon options customers to prevent people from taking risks that they do not understand or cannot afford.

After reaching her broker and giving him her account number, Lisa asks for a quote for the Microsoft January 55 put option contract. To obtain the quote for this option, the broker must first find its ticker symbol. After consulting an electronic list of available trading vehicles for MSFT (the stock ticker symbol for Microsoft), the broker confirms that the ticker symbol for the January Microsoft 55 put contract is MSQMK. The first three letters refer to Microsoft. The last two letters refer to the January 55 put contract. He enters this information into his quotation system to obtain the quote that Lisa requested. The quote for the contract is 4.20 bid, 4.50 offered, last sale at 4.30. The broker also reports that Microsoft stock last traded at 55.44.

Upon hearing the quote, Lisa decides to issue a limit order. She instructs her broker to buy 20 Microsoft January 55 put option contracts, limit price 4.40. The broker enters the order into his electronic order entry system, and then reads it back to Lisa for her confirmation. After listening carefully to the broker, Lisa confirms that the order is correct. The broker then releases the order.

The brokerage's order-routing system sends the order electronically to the Pacific Exchange's order-routing system. This system, called POETS (Pacific Options Exchange Trading System), can forward the order to any of several destinations on the Exchange options floor in San Francisco. For this order, the brokerage's system instructs POETS to route the order to the exchange order book, which an exchange order book official (OBO) manages. The OBO is an employee of the Pacific Exchange who will act as the broker for the order.

The Exchange shows its order book overhead on large computer displays to a crowd of about 20 traders standing in front of the post where Microsoft options trade. Some of these traders are brokers who represent their clients, and some are dealers called market makers, who trade for their own account. When Lisa's order arrives, all the traders notice it. Several traders try to sell at 4.40 by immediately shouting, "Sell that book." The OBO trades a total of 20 contracts with three traders. The OBO then enters information about the trade into POETS, and POETS sends a report of the trade to Lisa's broker.

The broker confirms the trade with Lisa. Although Lisa is initially quite pleased with the trade price, it occurs to her to ask where Microsoft stock is now trading. The broker reports that the last trade in Microsoft was 55.84, 40 cents higher than before. Since the price of Microsoft has risen, the put contract price has dropped. Although the price she obtained was good, it was not as good as it initially seemed. Lisa asks for the current quote in the January 55 put option. The broker reports that the quote is now 4.00 bid, 4.30 offered.

The brokerage, the exchange, and the other traders arrange for settlement of the contract through the Options Clearing Corporation. The OCC clears all exchange-traded option contracts in the United States. It also guarantees performance on all contracts, using mechanisms similar to those described above for the futures markets.

2.8 A BOND MARKET TRADE

Sam works for Sheltered Life, a large (fictitious) insurance company, where he helps manage the bond operations. The firm, like many other insurance companies, invests a substantial fraction of its reserves in long-term corporate bonds. Periodically, the firm must buy new bonds to replace those which have matured and to invest additional funds that its clients give it to manage.

Every day, throughout the day, Sam receives phone calls from sales traders at various investment banks who would like to sell him bonds. The sales traders sometimes offer newly issued bonds that their banks have underwritten. Other times, they offer seasoned bonds that their banks have in inventory. Because Sam is a very big client, the traders all try to please him. Sam talks to them to keep abreast of market conditions.

This morning, Sam has determined that he needs to buy 50 million dollars of long-term corporate investment-grade bonds. After examining his portfolio, and after studying general conditions in the credit markets, Sam has decided that he would like to buy bonds issued by a high-tech firm.

From many years of experience, Sam believes that he will most likely obtain the type of bond he wants today at the best price from Salomon Brothers. He calls up the sales trader who manages his account there and asks him to fax over a list of the long-term, investment-grade high-tech bonds that they have in inventory.

After receiving the list, Sam sees that it contains the IBM $7\frac{1}{2}$ s13 bond. This bond pays a coupon of $7\frac{1}{2}$ percent and matures in 2013. Sam is already familiar with the bond covenant (the terms of the bond) and with IBM's general creditworthiness. He decides that if he can get a good price, he would like to buy this bond. Sam now turns to his Bloomberg terminal to examine prices in the credit markets to get some idea of the price the bond should trade for.

Sam then calls the Salomon Brothers sales trader and asks him to quote a price for the bond. The sales trader quotes him an offering price of 112, which corresponds to 112 percent of the face value of the bond. Sam explains that this price is too high, given current market conditions and the various options that appear in the covenants for that bond. He instead proposes to buy the bond for 70 basis points over the rate of return implied by the on-the-run 10-year Treasury bond. This bond trades in a very active market organized by Cantor Fitzgerald, which is the world's largest U.S. government bond brokerage. After performing some quick calculations, the sales trader determines that the equivalent price is $111\frac{1}{8}$, which is too low for him. The two traders continue negotiating until they agree to a price of $111\frac{5}{8}$.

They both write up trade tickets and give them to their respective operations clerks to settle the trade. The clerks arrange for settlement through a clearinghouse called the National Securities Clearing Corporation (NSCC), a division of the Depository Trust and Clearing Corporation (DTCC). NSCC is by far the largest clearinghouse in the United States. It will act as an escrow agent in a process known as delivery versus payment. NSCC uses a book entry settlement system in which it transfers securities electronically from one account to another.

Sam's clerk reports the trade to Sheltered Life's custodial bank, Chase Manhattan, which will settle the trade. A custodial bank is a firm that holds

securities and money on behalf of its clients. A clerk at Chase reports the trade to NSCC, and ensures that enough money is available in Chase's account at NSCC to cover the transaction.

Salomon Brothers acts as its own custodian. The Salomon operations clerk reports the trade directly to NSCC and arranges to transfer the bond to its account there.

On the day of the trade, NSCC should receive both reports of the trade. Overnight, NSCC will match the reports. If the two reports match perfectly, NSCC will confirm the trade to both sides on the next day. If the two reports do not match, or if one trader does not report a trade, NSCC will send DK (Don't Know) notices to both sides to report the discrepancies. The traders then will attempt to reconcile the reports.

On the third day after the trade, known as T+3, NSCC will simultaneously transfer the bond from Salomon's account to Chase's account, and the money from Chase's account to Salomon's account. These transfers will settle Salomon's side of the trade. The bank then will transfer the bond from its account to Sheltered Life's account and the money from Sheltered Life's account to the bank's account to complete the settlement for Sheltered Life.

2.9 A FOREIGN EXCHANGE TRADE

BINC is a medium-sized U.S.-domiciled manufacturer of electric parts used in extreme pressure and chemical environments. It has decided to open a manufacturing subsidiary in Scotland to gain a toehold in the European Community. Until the new operation starts to generate its own revenue, BINC will need to convert dollars to British pounds to pay its rent and salaries.

Olive, BINC's CFO, needs to buy 5 million pounds and transfer them to its account at a Scottish commercial bank. She first consults an Internet page created by Yahoo! that reports current exchange-rate indications. There she sees that the approximate exchange rate is 1.447 dollars per pound. She then calls her banker, Bill, and asks him to quote a price for the purchase and transfer of 5 million pounds to BINC's Scottish commercial bank. After verifying that BINC has sufficient dollars on deposit to buy the pounds, Bill asks Olive to hold while he calls the foreign exchange desk of his bank.

Although BINC's bank is a large regional commercial bank, it does not make a market in British pounds. Instead, it will buy the pounds from a dealer and then sell them to BINC.

Fred, the bank's FX (foreign exchange) trader, takes the call and immediately consults an FX page on his desktop Reuters Dealing 3000 terminal to see some representative dealer quotes. While keeping Bill on the line, Fred picks up another line and calls Norm, a dealer at a large New York bank, to ask him for his quote. Fred calls Norm because he believes he generally receives good service from him, and perhaps also because Norm occasionally takes Fred to NBA basketball games. Norm bids 1.4473 dollars per pound for pounds and offers pounds at 1.4475 dollars per pound. Fred then tells Bill that the bank will sell BINC 5 million pounds at the rate of 1.4477 pounds per dollar. Bill tells Olive, who agrees to the transaction. Bill then tells Fred, who immediately arranges to buy pounds from Norm. By convention, both Fred and Norm understand that the quotes are good only for 1 million dollars. Fred asks to sell 7 million dollars, and Norm agrees.

Fred therefore purchases 4.835 million pounds from Norm (7 million dollars ÷ 1.4475 dollars per pound). Fred and Norm then report the trade to their clerks, who will arrange a wire transfer between their two banks. Meanwhile, Sam arranges with Olive to debit BINC's dollar account by 7,238,500 dollars (5 million pounds × 1.4477 dollars per pound) and to wire 5 million pounds to BINC's Scottish bank. The regional bank takes the remaining 154 thousand pounds from its pound accounts. Since the 5 million pounds cost the bank 0.002 dollar per pound less than it paid for them, the bank makes 1,000 dollars on the transaction.

Part I

The Structure of Trading

The chapters in this part describe how traders arrange their trades. We start in chapter 3 with a quick introduction to the trading industry. This chapter provides some background information about who trades, what they trade, where they trade, and how their trading is regulated. You can safely skip reading this chapter if you are already familiar with the industry.

Chapter 4 describes how traders communicate their orders to the brokers, dealers, and exchanges that arrange their trades. We describe the orders that traders use and examine the properties of those orders. We also establish important concepts about the origins of liquidity in this chapter.

In chapter 5, we consider how market structures vary. The differences in how markets organize their trading are important because they affect the profitability of different types of traders. We start to consider the relative advantages of various trading systems in this chapter.

Chapter 6 describes how exchanges use order-driven market mechanisms to arrange trades. The discussion introduces important issues that affect how traders formulate optimal order submission strategies.

Chapter 7 discusses how brokers serve their clients. We carefully describe their roles as trade negotiators and as clearing and settlement agents. You may find this chapter most interesting for its discussions about how markets prevent traders from engaging in various types of fraudulent activities.

3 The Trading Industry

This chapter provides a brief survey of the trading industry. If you are already familiar with the industry, you can safely skip this chapter. If you are new to trading, the discussions here will provide you with the "big picture" that will allow you to better understand the rest of this book. In particular, you will be better able to discriminate between issues of primary and secondary importance if you know the context in which traders solve their trading problems.

This chapter is full of financial jargon and institutional detail. Most of it is not necessary for understanding the remainder of this book. If you are interested only in understanding market structure, you need not master the details.

We first consider who trades. Then we characterize trading instruments and the markets where they trade. Finally, we examine how regulators oversee trading.

3.1 WHO ARE THE PLAYERS?

Traders are people who trade. They may arrange their own trades, they may have others arrange trades for them, or they may arrange trades for others. *Proprietary traders* trade for their own accounts, and *brokers* arrange trades as agents for their clients. Brokers are also called *agency traders*, *commission traders*, or *commission merchants*. Proprietary traders engage in *proprietary trading*, and brokers engage in *agency trading*.

Traders have *long positions* when they own something. Traders with long positions profit when prices rise. They try to buy low and sell high.

Traders have *short positions* when they have sold something that they do not own. Traders with short positions hope that prices will fall so they can repurchase at a lower price. When they repurchase, they *cover their positions*. *Short sellers* profit when they sell high and buy low.

The trading industry has a buy side and a sell side. The *buy side* consists of traders who buy exchange services. Liquidity is the most important of these services. *Liquidity* is the ability to trade when you want to trade. Traders on the *sell side* sell liquidity to the buy side. A substantial fraction of this book considers how interactions between buy-side and sell-side traders determine the price of liquidity.

(The buy and sell sides of the trading industry have nothing to do with whether a trader is a buyer or a seller of an instrument. Traders on both sides of the trading industry regularly buy and sell securities and contracts. The terms "buy side" and "sell side" refer to buyers and sellers of exchange services.)

3.1.1 The Buy Side

The buy side of the trading industry includes individuals, funds, firms, and governments that use the markets to help solve various problems they face.

TABLE 3-1.
The Buy Side of the Trading Industry

TRADER TYPE	GENERIC EXAMPLES	WHY THEY TRADE	TYPICAL INSTRUMENTS
Investors	Individuals Corporate pension funds Insurance funds Charitable and legal trusts Endowments Mutual funds Money managers	To move wealth from the present to the future for themselves or for their clients	Stocks Bonds
Borrowers	Homeowners Students Corporations	To move wealth from the future to the present	Mortgages Bonds Notes
Hedgers	Farmers Manufacturers Miners Shippers Financial institutions	To reduce business operating risk	Futures contracts Forward contracts Swaps
Asset exchangers	International corporations Manufacturers Travelers	To acquire an asset that they value more than the asset that they tender	Currencies Commodities
Gamblers	Individuals	To entertain themselves	Various

These problems typically originate outside of trading markets. For example, investors use securities markets to solve intertemporal cash flow problems: They have income today that they would like to have available in the future. They use the markets to buy stocks and bonds to move their income from the present to the future. We discuss this problem and other buy-side trading problems in chapter 8.

Many buy-side institutions are pension funds, mutual funds, trusts, endowments, and foundations that invest money. These institutions are known collectively as *investment sponsors*. Investment sponsors frequently employ *investment advisers* to manage their funds. Investment advisers are also called *investment counselors*, *investment managers*, or *portfolio managers*. Investment advisers often employ traders to implement their trading decisions. These traders are *buy-side traders*. The people and institutions who will ultimately benefit from the funds that *investment sponsors* hold are *beneficiaries*. A summary of buy-side traders appears in table 3-1.

3.1.2 The Sell Side

The *sell side* of the trading industry includes dealers and brokers who provide exchange services to the buy side. Both types of traders help buy-side traders trade when they want to trade.

Dealers accommodate trades that their clients want to make by trading with them when their clients want to trade. Dealers profit when they buy low and sell high. We discuss dealers in chapter 13.

The Wire in Wirehouse

Traders often call large broker-dealers *wirehouses*. The word "wire" in wirehouse once referred to the telegraph. Following its invention, broker-dealers used the telegraph to collect orders from branch offices in distant cities. Those who quickly adopted it were able to expand their businesses substantially and thereby greatly increase their profits. The ability to communicate quickly was—and remains—very important in the trading industry.

In contrast, *brokers* trade on behalf of their clients. Brokers arrange trades that their clients want to make by finding other traders who will trade with their clients. Brokers profit when their clients pay them commissions for arranging trades with other traders. We discuss brokers in chapter 7.

Many sell-side firms employ traders who both deal and broker trades. These firms therefore are known as *broker-dealers* or *dual traders*.

The sell side exists only because the buy side will pay for its services. We therefore must understand why the buy side trades before we can understand when the sell side is profitable. We consider how and why both sides trade in subsequent chapters. Table 3-2 provides a summary of the sell side of the trading industry.

3.2 TRADE FACILITATORS

Many institutions help traders trade. We introduce exchanges, clearing and settlement agents, depositories, and custodians in this section.

3.2.1 Exchanges

Exchanges provide forums where traders meet to arrange trades. Exchange traders may include dealers, brokers, and buy-side traders. Only members can trade at most exchanges. Nonmembers trade by asking member-brokers to trade for them. Historically, traders met on exchange floors. Now, at many exchanges, traders meet only via electronic communications networks.

Some exchanges only provide a forum where traders meet to arrange their trades as they see fit. Other exchanges have *order-driven trading systems* that arrange trades by matching buy and sell orders according to a set

TABLE 3-2.
The Sell Side of the Trading Industry

TRADER TYPE	GENERIC EXAMPLES	WELL-KNOWN U.S. EXAMPLES	WHY THEY TRADE
Dealers	Market makers Specialists Floor traders Locals Day traders Scalpers	Spear Leads & Kellogg LaBranche & Co. Bernard L. Madoff Investment Securities Knight Trading Group TimberHill LLC	To earn trading profits by supplying liquidity
Brokers	Retail brokers Discount brokers Full-service brokers Institutional brokers Block brokers Futures commission merchants	Charles Schwab & Co. E*Trade Dreyfus Brokerage Services Abel/Noser Corp. XpressTrade Cargill Financial Markets Group	To earn commissions by arranging trades for clients
Broker-dealers	Wirehouses	Goldman Sachs Merrill Lynch Salomon Smith Barney Morgan Stanley Dean Witter Credit Suisse First Boston	To earn trading profits and trading commissions

of rules. These exchanges may use computers, clerks, or their member-traders to process orders. Order-driven exchanges are essentially brokerages because they arrange trades for their clients. Exchanges and brokerages therefore often compete with each other.

Some U.S. equity trading systems are known as *electronic communications networks* (ECNs). These are order-driven trading systems that are not regulated as exchanges. Brokerages, dealers, or other entities may own them. The most important ECNs are Island ECN, Instinet, REDIBook, Archipelago, and Bloomberg Tradebook. Many ECNs are in the process of registering to become exchanges.

Exchanges once were owned and controlled by their members. Membership organizations, however, tend not to be nimble competitors. Conflicts among members and cumbersome governance mechanisms often ensure that membership organizations cannot innovate quickly. To compete more effectively with ECNs, brokerages, and other exchanges, many exchanges have converted, or are in the process of converting, to corporate ownership. With corporate ownership, they hope to obtain highly motivated, empowered, entrepreneurial management. The Nasdaq Stock Market, the Chicago Mercantile Exchange, the Stockholm Stock Exchange, the Toronto Stock Exchange, and the Deutsche Börse are examples of exchanges that have recently demutualized.

Not all trading takes place at exchanges. In many markets, dealers and brokers arrange trades *over the counter*. The corporate bond market is an example of a large market in which almost no trading takes place at organized exchanges.

3.2.2 Clearing and Settlement Agents, Depositories, and Custodians

Several agencies facilitate trading by helping traders settle the trades they have arranged. They also prevent problems that can arise when some traders are not trustworthy or creditworthy.

3.2.2.1 Clearing Agents

When traders arrange trades on exchange floors or over the telephone, the buyers and sellers both make a record of their trades. They record the terms of their trades and the identities of the traders with whom they traded. To settle their trades, buyers and sellers must compare their records. In most markets, traders submit their records to a common clearing agent to facilitate these comparisons. The *clearing agent* matches the buyer and seller records and confirms that both traders agreed to the same terms. Once trades are cleared, traders then settle their trades. The largest securities clearing agency in the United States is the *National Securities Clearing Corporation* (NSCC).

A trade *clears* if the buyer and seller both report that they traded with each other, and their reported terms of trade are identical. If the records do not match exactly, the clearing agent reports the discrepancies to the traders, who then try to resolve them. In the futures markets, such trades are called *out-trades*. In the securities markets, they are called *DKs* (for *Don't Know*).

Clearing is a trivial exercise when automated order-matching systems arrange all trades. Since these systems know everything about the trades they arrange, they always report matched trades.

T+5 and Counting Down

Brokers and regulators would like to settle security trades as quickly as possible in order to minimize trader exposure to credit risks. During the time between the negotiation of a trade and the time it settles, prices can change substantially. The side that is hurt by the price change then may be unable or unwilling to settle the trade. Such failures can be quite painful to the other side. Traders minimize failure risk by settling their trades quickly. Until June 1995, the U.S. securities industry settled stock and bond trades on T+5. It now settles trades on T+3. Starting in June 2005, the industry intends to settle on T+1. T+1 settlement will require most traders to deposit money and certificates with their brokers before they trade, to ensure that they can settle the next day.

3.2.2.2 Settlement Agents

Settlement agents help traders settle their trades. They receive cash from buyers and securities from sellers. When both sides have performed, the settlement agent gives the cash to the seller and the securities to the buyer.

Traders use settlement agents because the agents are very efficient at settling trades, and because they can help them avoid the losses that can arise if they trade with an untrustworthy or uncreditworthy trader. In the real estate markets, settlement agents are called *escrow agents*. Since clearing and settlement are closely related, the National Securities Clearing Corporation is also, not surprisingly, the largest U.S. securities settlement agency.

Much of the efficiency in the settlement process is due to net settlement. Under *net settlement*, for each client, the settlement agent nets the buys and sells in each security to a single net security position. The settlement agent also nets all money credits and debits into a single net money position for each client. The agent then settles only the net positions. Through netting, the settlement agency can vastly reduce the number of transactions necessary to settle trades. Net settlement works best when all traders use the same settlement agent.

In U.S. securities markets, *normal-way settlement* occurs three business days after trades are arranged. Such settlement is called *T+3* settlement. Almost all transactions settle on T+3. Traders can also arrange special settlement on other days. The most common special settlement instruction is *cash settlement*, which occurs on the day of the trade.

3.2.2.3 Clearinghouses

Many futures, options, and swaps markets have clearinghouses associated with them. The *clearinghouses* clear and settle all trades in these derivative contracts. They also usually guarantee that both parties will perform on their contracts. They do this by acting as buyer for every seller and as seller for every buyer. They therefore are the issuers and guarantors of their contracts.

Clearinghouses generally are owned by *clearing members*, who are jointly responsible for settling all trades. Traders who are not clearing members must have a clearing member guarantee the settlement of their trades. If a trader fails to settle a trade, his clearing member must do so. If a clearing member fails to settle a trade—usually due to bankruptcy—the clearinghouse can tax its other members to settle the trade. The clearinghouse is therefore like a mutual insurance company.

Since losses can be quite significant, clearinghouses pay very close attention to the credit quality of their members and to the potential settlement risks that they can impose upon other traders. To control these risks, clearinghouses require that their members post collateral called *margins* to secure their obligations, provide timely information about their financial conditions and their trading activities, and not exceed positions limits that the clearinghouse establishes for them. The exchanges do not allow members to trade without approval from the clearinghouse.

In futures markets, final settlement takes place when the contracts mature. After every trading day, traders also make an intermediate settlement of their accounts in which they transfer profits earned that day from losers to winners. Brokers make these transfers to and from their customers' margin accounts through the intermediation of the exchange clearinghouse. These *variation margin* adjustments ensure that the incentives to default on a contract do not grow as prices move against a losing position.

The Brazilian Straddle

A trader has a *straddle* when he holds positions in two different types of instruments. The risks in the two instruments often offset each other so that the combined position is less risky than either position held alone. In the options markets, a straddle consists of a position in a put and an offsetting position in a call.

Technically bankrupt traders present a special problem to the firms that guarantee their trades. Traders are *technically bankrupt* when they no longer have enough wealth to settle their trades. If prices do not change in their favor, they soon will be forced into actual bankruptcy.

When traders know that they are technically bankrupt, they have nothing to lose by massively increasing their positions. If prices change so that their positions make money, they may escape their financial problems. If prices change against them so that they lose even more, those who guarantee their trades will suffer the losses.

A trader who uses this strategy is said to hold a Brazilian straddle. A *Brazilian straddle* consists of a large market position held against a one-way airline ticket to Brazil in the breast pocket. If the market position proves profitable, the trader sells the ticket and comes back to trade tomorrow. If the trader continues to lose, he runs off to Brazil and leaves his clearing member to clean up the resulting mess.

Clearing members must carefully monitor the traders who clear through them to ensure that their customers do not try to play the Brazilian straddle. To avoid the problem, they require that their customers report their positions frequently during the day. They also require that their customers make margin payments within the day when prices move substantially against their positions. Finally, when they determine that their customers cannot settle their trades, they prohibit them from trading.

Clearing firms also execute contracts with their customers that allocate any profits earned by technically bankrupt customers to the clearing firm if the customer did not report the problem. This provision takes the profit out of the successful Brazilian straddle. It works, however, only if the clearing firm detects the bankruptcy.

A Typical Set of Relationships

A large state pension fund receives money from the state treasury to hold and invest for its beneficiaries. The pension fund deposits the money in its account at its custodian bank. It also notifies its investment adviser that it has money available for investment.

A portfolio manager who works for the investment adviser considers how to best invest the funds. The manager considers the portfolio that the sponsor presently holds, the expected pension liabilities that the fund must satisfy, and the investment opportunities that the adviser believes it can identify. The manager decides to buy 30,000 shares of Cisco Systems.

The portfolio manager contacts his firm's buy-side trader—a fellow employee—and instructs her to buy 30,000 shares of Cisco Systems. She then issues an order to the state pension fund's broker to buy the shares. For political reasons, the state pension fund may direct its investment adviser to use brokers domiciled in the state when trading on its behalf.

The broker calls a dealer and arranges the trade. The dealer sells the shares to the pension fund out of its inventory. The dealer and the broker both report the trade to the National Securities Clearing Corporation (NSCC). The broker also reports the trade to the pension fund and to the investment adviser. Three days later, on instructions from the dealer and the pension fund, NSCC settles the trade. The custodian bank sends money to the pension fund's account at the Depository Trust Company (DTC). The DTC then provides the money to settle on behalf of the pension fund, and it receives the 30,000 shares on behalf of the pension fund.

Straight-Through Processing

Trading systems that fully automate the clearing and settlement process provide *straight-through processing* (STP) to their clients. Traders like STP because it is cheap and minimizes the potential for errors.

3.2.2.4 Depositories and Custodians

Depositories and custodians hold cash and securities on behalf of their clients. They help settle trades by quickly delivering cash and security certificates—when properly instructed—to settlement agents. Depositories and custodians also help ensure the security of their clients' assets.

The largest depository in the world is the *Depository Trust Company* (DTC). DTC holds nearly 20 trillion dollars in assets for its participants and their clients. It is a subsidiary of the Depository Trust and Clearing Corporation (DTCC). The other major subsidiary of DTCC is the National Securities Clearing Corporation (NSCC).

3.3 TRADING INSTRUMENTS

The securities, contracts, commodities, and currencies that traders trade are collectively known as *trading instruments*. Trading instruments vary by type. They include real assets, financial assets, derivative contracts, insurance contracts, and gambling contracts. *Financial instruments* include financial assets, derivative contracts, and insurance contracts.

This section describes various classes of trading instruments and special aspects of the markets in which they trade. It also defines some common trading instruments. A summary of the various classes of instruments appears in table 3-3.

TABLE 3-3.
Trading Instrument Summary

CLASS	INSTRUMENT	CREATORS
Real assets	Spot commodities	Farmers, miners, manufacturers
	Intellectual properties	Inventors and artists
	Real estate	Builders
	Pollution emission rights	Governments
Financial assets	Stocks and warrants	Corporate issuers
	Bonds	Corporate issuers, governments
	Trust units	Trusts
	Currencies	Governments, banks
Derivative contracts	Futures contracts	Sellers
	Forward contracts	Sellers
	Options	Sellers
	Swaps	Sellers
Insurance contracts	Insurance policies	Corporations
	Reinsurance contracts	Corporations
Hybrid instruments	Warrants	Corporate issuers
	Index linked bonds	Corporate issuers
	Convertible bonds	Corporate issuers
Gambling contracts	Numerous types	Individuals
		Bookies
		Casinos
		Racetracks

3.3.1 Real Assets

Real assets include physical commodities, real estate, machines, patents, and other intellectual properties. Real assets also include *pollution credits*, which are rights to emit a specified quantity of a given type of pollution. Real assets are instruments that would appear only on the asset side of a balance sheet.

The real assets that trade in the most liquid markets are industrial and precious metals, agricultural commodities, fuels, and pollution credits. These instruments generally are quite fungible: One unit is very similar, if not identical, to all other units. Traders in these commodities generally are more concerned about price than about quality variations. They usually can easily adjust prices for any quality variations.

3.3.2 Financial Assets

Financial assets are instruments that represent ownership of real assets and the cash flows that they produce. Stocks and bonds are financial assets because they represent ownership of the assets of a corporation. Stockholders own the assets of a corporation after all creditors have been paid off. Bondholders own the assets of a corporation if the corporation defaults on its creditors and becomes bankrupt. Other financial assets include currencies, warehouse receipts that represent ownership of physical commodities, and trust units that represent ownership of the assets of a trust.

Issuers create all financial assets. Corporations issue stocks, bonds, and warrants. Governments issue currencies and bonds. Warehouses issue commodity receipts. Trusts issue trust units. Many securities are called *issues* because issuers issue them.

Financial assets appear on both sides of a balance sheet. A financial asset appears as a liability on the issuer's balance sheet and as an asset on the holders' balance sheet.

Issues trade in *primary markets* when issuers first create and sell them. Subsequent trading occurs in *secondary markets*. *New issues* become *seasoned securities* after they are issued. Traders therefore trade new issues in primary markets and seasoned issues in secondary markets. Traders say that primary trading in new equity issues takes place in the *initial public offering* (IPO) *market*.

Issuers often use the services of *underwriters* to help them sell their securities. *Underwriters* are broker-dealers at investment banks who find buyers for the securities. In a *best efforts offering*, the underwriter acts strictly as a broker. In an *underwritten offering*, the underwriter guarantees the issuer an offering price. If the underwriter cannot find buyers for the securities at the offering price, the underwriter buys them for its own account. In a *fixed-price open offering*, the underwriter sets a price and buyers subscribe to the offering. If the offering is oversubscribed, the underwriter conducts a lottery to allocate the shares. Underwriters generally charge issuers fees for their services.

Commodities and currencies trade for immediate delivery in *spot markets*. They trade for future delivery in *forward markets* or *futures markets*. Farmers, miners, and manufacturers create most physical commodities, and national central banks create most currencies.

3.3.2.1 Definitions of Some Common Financial Assets

Equities

Stocks represent ownership of corporate assets, net of corporate liabilities. Stock values depend on corporate assets, liabilities, and income. They also

depend critically on how well traders expect corporate managers will use corporate assets in the future.

Preferred stocks are stocks that pay dividends at contractually specified rates. Corporations must pay all accrued dividends on preferred stocks before they can pay any dividends on common stock.

American depository receipts (ADRs) are trust units that traders use to trade foreign stocks in U.S. markets. Each trust holds only the stock of a single foreign company. ADRs are popular because they allow traders to avoid international settlement problems.

Exchange-traded funds (ETFs) are mutual funds that trade at exchanges. They have become extremely popular in recent years. Most ETFs are *index funds* that try to mimic the returns of a market or industry index.

Real estate investment trusts (REITs) are trusts that own real estate. By *securitizing* real estate, they allow investors and speculators to trade real estate interests like common stock shares.

Debt Instruments

Bonds are debt securities issued by corporations, governments, and occasionally individuals. Debtors create bonds when they borrow money. Bond values depend on interest rates, issuer creditworthiness, assets pledged as collateral, and attached options. Traders usually quote bond prices as a percentage of their *par value*. For example, the price of a million-dollar Treasury bond quoted at 97 is 970,000 dollars.

A *straight bond* is a bond that pays interest periodically until it matures. At maturity, the issuer redeems the bond for its *principal* or *face value*. Straight bonds usually do not have attached options.

Credit quality, the probability that a bond issuer will make all bond payments when they are due, greatly concerns bond investors. Investors expect that the issuers of *investment grade bonds* will make all interest and principal payments on time. The interest and principal payments on *junk bonds* are less certain. The latter are also called *high yield bonds* because investors require high yields to compensate for the probability that the issuers will default on their payments. The credit quality of a bond depends on the financial strength of its issuer and upon that collateral and bond covenants that the issuer uses to secure the bond.

Treasury bills, *Treasury notes*, and *Treasury bonds* are debt securities issued by a country. Bills normally mature in one year or less. Notes normally mature two to five years after they are issued, and bonds normally mature ten or more years after they are issued. Bills do not pay interest. Instead, they sell at a discount from their *face value*.

Zero coupon bonds pay no interest. They simply return their principal value at maturity. Since they pay no interest, buyers will buy them only at a discount from their face value. *Zero coupon bonds* therefore are also known as *pure discount bonds*. The greater the time to maturity, the greater the discount. A straight bond is equivalent to a bundle of zero coupon bonds consisting of one zero-coupon bond due on each interest payment date plus a zero-coupon bond due when the straight bond matures. The principal values of the various bonds correspond to the various payments due on the straight bond.

Commercial paper is a short-term debt security issued by a corporation. Commercial paper usually matures in nine months or less from the date it is issued.

Stripping Bonds

When traders want more zero-coupon bonds than are available, zero-coupon bonds become expensive relative to straight bonds. *Fixed-income arbitrageurs* then buy straight bonds and *clip* the coupons. They bundle the coupons by their interest payment dates and sell the bundles and the remaining final principal payments as zero coupon bonds.

Traders call this process *stripping a bond*. The term comes from a time when all bonds were bearer bonds. The owners of *bearer bonds* are not registered with bond issuers. Since issuers cannot keep track of who owns their bearer bonds, they make interest payments only when the bondholders present them with interest coupons clipped from the side of the paper upon which the bonds are printed. The coupons are dated so that each one corresponds to an interest payment date. The final principal repayments occur when the bondholders present the now fully stripped bonds to the issuers.

Mortgage-backed securities are bondlike instruments which receive the mortgage payments that borrowers make on their mortgages. The securities are backed by a specified set of mortgages called a *mortgage pool.* Since they receive the mortgage payments as they are paid, they are examples of *pass-through securities.*

Collateralized mortgage obligations (CMOs) are mortgage-backed securities that divide rights to the cash flows from the mortgage pool into several different *tranches.* Each tranche has different rights to the payments that the mortgage borrowers make. Issuers generally structure the CMO tranches to look like various types of bonds. The first tranche has the highest claim on the mortgage payments and therefore is the least risky. When its claims are satisfied, the next tranche is paid, and so on until the available funds are exhausted. The last tranche, which is usually called the Z tranche, gets whatever is left over. It is obviously the most risky tranche. CMOs are also called *real estate mortgage investment conduits* (REMICs). Companies issue CMOs to distribute mortgage prepayment risk and interest rate risk among investors with varying degrees of risk tolerance.

All debt instruments are collectively known as *fixed-income products.*

3.3.3 Derivative Contracts

Derivative contracts are instruments that derive their values from the values of the *underlying instruments* upon which they are based. They are contractual agreements between buyers and sellers that specify the exchange of certain privileges and liabilities. Derivative contracts include forward contracts, futures contracts, options, and swaps.

Sellers create derivative contracts when they first sell them. Derivative contracts therefore are in *zero net supply.* The sum of all long positions minus the sum of all short positions is always zero.

All derivative contracts have an element of *futurity*: Their values depend on future events. For example, the prices of futures, options, and forwards all depend on future prices of their underlying instruments.

Almost all derivative contracts have an *expiration date.* On that date, traders make final settlement and the contract expires. European traders refer to this date as the *expiry* of the contract. Contracts that do not expire are *infinitely lived.* Exchanges and investment banks have proposed many infinitely lived derivative contracts, but none have been notably successful.

Derivative contracts may be physically settled or cash settled. A *physically settled contract* requires that the seller deliver the underlying instrument to the buyer when obligated to do so. At that time, the buyer pays cash for the instrument at the agreed price. A *cash-settled contract* requires that the seller deliver the cash value of the underlying instrument to the buyer when obligated to do so. At the same time, the buyer pays the agreed-upon purchase price. In practice, the traders transfer only the difference between the value and the price. If the contract is a futures contract, the difference might be negative. In that case, the seller pays the buyer the difference. If the contract is an option contract, the difference will never be negative because contract holders will not exercise their options when doing so would require that they make additional payments.

Derivative contracts always have a *notional size* or *notional value.* For physically delivered contracts, the *notional size* is simply the amount that

Toxic Waste

The riskiest CMO tranches are called *toxic waste* because no one wants to hold them. They typically sell at highly discounted prices. Foolish people often pay too much for them because these tranches will realize very high rates of return if very few mortgage borrowers default on their obligations. Toxic waste is worthless, however, if too many borrowers default. The inability of various organizations to fully appreciate the default risks in toxic waste has led to some spectacular trading losses.

A Tomato Forward

A tomato forward contract is an agreement between a buyer and a seller in which the buyer agrees to pay a fixed price for tomatoes that the seller will deliver in the future. The seller may not own the tomatoes when they negotiate the contract.

Tomato farmers generally execute forward contracts with food processors. The farmers obtain fixed prices for their harvests, and the food processors obtain fixed prices for the tomatoes they must buy to produce their products.

The Eurex ODAX Contract

Eurex trades a cash-settled option contract based on the German Deutscher Aktienindex (DAX) equity index. The notional value of this ODAX contract is five euros per index point, or 29,500 euros, given the 5,900 level of the DAX at the end of June 2001.

If you buy an ODAX call option with a strike price of 6,200 for 26.00 euros, you will pay 130 euros for the contract. If the DAX on the expiration date closes at 6,500, you will make five times the difference between the closing price and the strike price, or 1,500 euros. If the DAX remains below 6,200, you will not exercise the option, and it will expire worthless.

Variation Margin Example

Brad buys a 5,000-troy-ounce silver futures contract for 4.50 an ounce from Sharon at the COMEX division of the New York Mercantile Exchange (NYMEX). The NYMEX Clearing House guarantees that both traders will perform on the contract. On the next day, the price of silver rises by 5 cents. The NYMEX Clearing House requires that Sharon pay it 250 dollars (5,000 ounces times 0.05 dollar per ounce) in variation margin. Simultaneously, the Clearing House pays Brad 250 dollars in variation margin. If the price of silver is the same when the contract expires, Brad will pay 4.55 an ounce for the silver, and Sharon will receive 4.55 an ounce.

the seller must deliver. For cash-settled contracts, a formula specifies the *notional value* that determines the final cash settlement.

Many derivative contracts require that buyers and sellers make variational margin payments on a regular basis. *Variational margin payments* transfer money from buyers to sellers or from sellers to buyers to adjust the prices of their contracts to reflect current market conditions. This procedure ensures that contract values do not change as market conditions change. Variation margin payments therefore reduce the chance that traders will default when their contracts expire.

3.3.3.1 Some Derivative Contract Definitions

Forward contracts are contracts for the future sale of some commodity. The commodity may be a physical commodity, like pork bellies, or a financial commodity, like a currency. Since these contracts derive their values from the values of the underlying commodities, they are derivative contracts.

Standardized futures contracts are forward contracts that an exchange clearinghouse guarantees. Futures traders therefore do not care whether their counterparts are creditworthy. They only need to consider whether the clearinghouse is creditworthy. Moreover, since buyers and sellers trade the same contracts, and since the clearinghouse is a buyer to every seller and a seller to every buyer, traders can open a position by buying a contract from one trader and close the position by selling it to someone else. They do not need to buy and sell with the same trader to offset their positions.

An *option* represents the right—but not the obligation—to do something. *Option contracts* give their holders the option to buy or sell an underlying instrument (or, in the case of a cash-settled option, the cash value of an underlying instrument) at a fixed price. The *writer* of the option is the trader who sold the contract. The option is *written upon* the *underlying instrument*. A *call option* is an option to buy at a fixed *strike price*. A *put option* is an option to sell at a fixed strike price. If the option holder can exercise the option any time before the *expiration date*, it is an *American-style option*. If the holder can exercise only on the expiration date, it is a *European-style option*. Since option contracts depend on underlying security values, they are *derivative contracts*.

A *futures option contract* is an option contract written on a futures contract. The holder of a call option on a futures contract has the right to purchase a futures contract at a specified strike price. Likewise, the holder of a futures put option has the right to sell a futures contract at a specified strike price. Futures option contracts trade at the exchange where the underlying futures contracts trade.

Swaps are contracts for the exchange of two future cash flows. A *cash flow* is a series of payments. An *interest rate swap* provides for the exchange of a future series of fixed-rate interest payments for a future series of variable floating-rate interest payments. When they enter the contract, the traders negotiate the fixed-rate payments and agree upon a formula for computing the future variable-rate payments. A *currency swap* provides for the exchange of a future series of fixed payments in one currency for a future series of payments in another currency. Since the values of these contracts depend on the values of the cash flows that the traders swap, swaps are *derivative contracts*.

The Third Order Derivative of LIFFE

The London International Financial Futures and Options Exchange (LIFFE) trades a euro interest rate swap futures contract called the Swapnote. This is a cash-settled futures contract that prices the expiration day value of a standard bond-pricing formula for a hypothetical fixed-rate bond. The hypothetical bond consists of a series of notional fixed 6 percent interest payments followed by the return of the notional principal at the maturity of the hypothetical bond. The pricing formula uses discount rates that are derived from the *swaps yield curve*, which is computed from ISDA Benchmark Euribor Swap Rate fixings. The Swapnote futures contracts thus derive their values from prices in the swaps market.

LIFFE also trades options on Swapnote futures. The Swapnote futures option is a derivative on a derivative on a derivative. (It is an option contract on a futures contract based on swaps contract prices.)

Source: www.liffe.com

Swaptions are options on a swap contract. A trader who owns a swaption call has the right to buy a swap at the specified strike price.

3.3.4 Insurance Contracts and Gambling Contracts

Insurance contracts and *gambling contracts* are instruments that derive their values from the outcomes of future events. For example, the value of a fire insurance contract on a building depends on whether the building burns down. The value of a point spread bet on the Lakers depends on whether they win their basketball game by more than the specified point spread.

The distinction between an insurance contract and a gambling contract depends on the reasons why people buy them. People who are concerned about the loss that they would experience if some future event takes place buy insurance contracts. Such traders are called *hedgers*. Gambling contracts are arranged by people who have no other financial stake in the underlying event. People arrange gambling contracts for entertainment, whereas they arrange financial contracts to raise capital and reallocate risk.

Like derivative contracts, insurance contracts and gambling contracts have an element of futurity. They are also in zero net supply.

Whether the future price of an instrument is equal to some specified value is itself a future event. Derivative contracts therefore are contracts whose values depend on future events. We therefore can classify derivative contracts as insurance contracts or gambling contracts. In fact, many hedgers use derivative contracts to insure against risks that they face, and many traders use derivative contracts to gamble on future events in which they have no financial interest.

3.3.5 Hybrid Contracts

Some trading instruments defy easy classification because they embody elements of more than one type of instrument. For example, some oil companies issue oil-linked bonds. The interest that they pay depends on the price of oil. These bonds are financial assets because they represent ownership of the assets of the firm in the event of bankruptcy. They also are

Why Discuss Gambling Contracts?

Although we do not normally consider gambling contracts to be securities, the same economics that govern traditional securities markets also govern gambling markets. The close analogy between the two markets is both useful and harmful. It can be a source of powerful economic intuition, but it also has been the source of many important public policy problems. We will consider the role of gamblers in the markets throughout this book.

Shall We Quibble?

The distinctions between real assets, financial assets, derivative contracts, insurance contracts, and gambling contracts are somewhat arbitrary:

- Any instrument that defines a relation between a buyer and a seller is a contract. For example, a bond is a contract between bondholders (the buyers) and an issuer (the seller). We reserve the term "contract" for agreements that define a continuing relation between generally unrelated buyers and sellers.
- We could consider anyone who sells a contract an issuer. We reserve the term "issuer" for instruments that only one seller—typically a corporation—can create.
- All issues are in zero net supply if we count short positions of issuers. We reserve the term "zero net supply" only for contracts that public traders can create by selling.
- Virtually all instruments have an element of futurity because the value of anything that is not immediately perishable depends in large part on future events. For example, the value of cattle sold on the spot market depends on the future prices of meat, leather, and milk, and on the future prices of alfalfa, energy, and veterinarian services. We apply the term "futurity" only to contracts that settle in the future.
- All instrument values are correlated to some extent. For example, stock values are correlated with bond values because the discount rates that analysts use to value stocks depend on interest rates. These observations suggest, then, that we could classify stocks as derivative instruments. We reserve the term, however, for instruments whose values depend directly on other instrument values through some contractual mechanism rather than indirectly through common valuation factors.
- Precious metals like gold and silver are such close substitutes for money that many people consider them financial assets as well as real assets. Let's not quibble over this one.

derivative contracts because they derive at least part of their value from the price of oil.

An *equity warrant* issued by a corporation is another example of a hybrid contract. *Warrants* are options that allow the holder to purchase stock at a specified price from the issuing corporation at some time in the future. Since a corporation issues them, and since they represent ownership of the assets of the corporation under certain circumstances, they are financial assets. Since their value depends on the value of the underlying stock, they are like derivative contracts.

Convertible bonds are also hybrid contracts. The holder of a *convertible bond* can exchange it for stock under some circumstances. A convertible therefore is the combination of a straight bond plus an option to exchange the bond for stock. The straight bond is a financial asset. The option gives the convertible bond derivative properties because its value depends on the values of the straight bond and of the stock.

3.4 WHERE ARE THE TRADING MARKETS?

We briefly survey trading markets in this section. The main points to identify are the following:

- Stocks represent less wealth than the widespread attention given to them by the media would suggest.
- Trading volume depends in part on the number of available instruments. Markets with a great number of different instruments are often quite illiquid.
- Exchanges everywhere have been consolidating.

We first characterize trading in various instrument classes. Then we discuss where trading occurs in each instrument class.

3.4.1 The Magnitude of Trading

Organized markets appear throughout the economy. Table 3-4 characterizes the relative importance of the various types of traded instruments in the United States. Despite the tremendous attention given to the stock market in the media, stocks represent only about 20 percent of the capital wealth of the country. Most of the wealth is in real estate, which rarely trades, and in various types of bonds. Derivative contracts represent no wealth because they are all in zero net supply and do not represent ownership of real assets.

The major national exchanges in the United States list about 8,250 stocks, of which only a fraction trade actively. At the NYSE, the 250 most active stocks accounted for 62 percent of the total reported trading volume, and a larger percentage of the total dollar volume, in 2000. When trading the most active stocks, public traders often trade with other public traders. Otherwise, public traders often trade with sell-side dealers. Most trades are small retail trades; large institutional traders account for most share volume.

Although listed option contracts do not trade for most stocks, the number of listed option contracts far exceeds the number of stocks. For each option-eligible stock, options exchanges list many put and call options for various expiration months and for various strike prices. Very few option contracts trade frequently, however. The most frequently traded options are current month calls on actively traded stocks for which the strike price is close

TABLE 3-4.
U.S. Markets by Instrument Class

CLASS	CAPITAL WEALTH	TOTAL INSTRUMENTS	ACTIVELY TRADED INSTRUMENTS	TRADE FREQUENCY	NOMINAL TRADING VOLUME
Common stocks	20%	15,000	1,000	High	Low
Equity option contracts	0%	160,000	500	Moderate	Very low
Corporate bonds	15%	100,000	50	Low	Low
Municipal bonds	10%	1,000,000	0	Low	Low
Government bonds	10%	50	3	Moderate	Moderate
Futures contracts	0%	100	20	High	Moderate
Swap contracts	0%	20	2	Moderate	Moderate
Currencies	<1%	200	10	High	High
Spot commodities	<1%	Millions	25	High	Moderate
Real estate	50%	100,000,000	0	Very low	Low

Source: Author's estimates.

The New York Stock Exchange's Quantitative Listing Standards for Domestic Companies

Domestic companies that wish to list with the New York Stock Exchange must meet all of the following quantitative listing standards:

1. The company must have at least 2,000 U.S. shareholders that each hold at least one round lot, or it must have at least 2,200 shareholders and monthly average trading volume of at least 100,000 shares over the last six months, or it must have at least 500 shareholders and average monthly trading volume of at least 1 million shares over the last 12 months and at least 1.1 million publicly held shares.
2. The publicly held shares of the company must have an aggregate market value of at least 100 million dollars, or 60 million dollars if the company is listing at the time of its initial public offering.
3. The company must meet at least one of four alternative financial standards. These standards are quite detailed. We therefore consider only the first one: Pretax earnings must total at least 2.5 million dollars in the latest fiscal year, together with 2 million dollars in each of the preceding two years; or 6.5 million dollars in the aggregate for the last three fiscal years, together with a minimum of 4.5 million dollars in the most recent fiscal year, and positive amounts for each of the preceding two years.

Source: NYSE Listed Company Manual *at www.nyse.com/listed/listed.html, quoted on June 6, 2001.*

to the stock price (at-the-money options). Public traders sometimes trade these contracts with each other, but they typically trade with dealers when they buy or sell options.

The large number of corporate and municipal bond issues ensures that most issues hardly ever trade. Highly secure bonds are very good substitutes for each other when the bonds have similar financial terms. Managers of portfolios that hold high-quality investment grade bonds therefore are less concerned about the specific bonds they buy than about their financial terms. Since many fixed-income portfolios hold their bonds until maturity, some bond issues never trade again after they are first issued. The buy side trades bonds almost exclusively with dealers because the public buyers and sellers rarely simultaneously want to trade the same bond issue. When they do, they rarely know of each other's interest.

Government bond issues are far less numerous than corporate and municipal bond issues. They are also far larger. The tremendous size of these issues and the widespread interest in these securities make these markets extremely liquid. Although the public often trades government bonds with dealers, buy-side traders increasingly trade directly with other buy-side traders in new electronic trading systems.

Some of the world's most liquid instruments trade in futures markets. Contracts on major agricultural, industrial, and financial commodities are extremely useful to hedgers throughout the economy. The contracts also interest many speculators. Trading by hedgers and speculators, and trading among the dealers who serve them, generate very large volumes in many futures markets.

Some Regional Exchange Trivia

The Cincinnati Stock Exchange was founded in Cincinnati in 1885. Following adoption of the 1975 amendments to the Securities Exchange Act of 1934, it became the first U.S. electronic stock exchange. Its members now trade exclusively from their offices. The Exchange's computers reside in Chicago in the same building occupied by the Chicago Stock Exchange.

The Chicago Stock Exchange (CHX) was founded in 1882. It merged with exchanges in St. Louis, Cleveland, and Minneapolis/St. Paul to form the Midwest Stock Exchange in 1949. This name explains why its market quotation symbol is M. The Midwest Stock Exchange changed its name back to Chicago Stock Exchange in 1993. Measured by dollar trading volume, the CHX is the third largest stock exchange in the United States after the NYSE and Nasdaq. The CHX has aggressively used its unlisted trading privileges to trade Nasdaq stocks.

The merger of the San Francisco Stock and Bond Exchange (founded in 1882) and the Los Angeles Stock and Oil Exchange (founded in 1899) formed the Pacific Stock Exchange in 1957. It later changed its name to the Pacific Exchange (PCX). Following the merger, PCX maintained separate trading floors in Los Angeles and San Francisco where competing specialists traded the same stocks. To save money, the PCX closed its equity floors in 2001 and 2002, and allowed its traders to trade from their offices. In 2000, PCX entered a joint venture agreement with the Archipelago ECN to form a fully electronic exchange called Archipelago Exchange. After the SEC approved its application for exchange status in October 2001, the PCX moved its equity trading to the Archipelago Exchange in 2002.

The most important world currencies trade in extremely liquid markets. Volumes are high because international trade and cross-border capital transactions generally require currency conversions. The structure of currency markets also ensures that dealers trade several times with each other for every trade that they make with a client.

Real estate trades in brokered markets because every parcel is unique. The difficulties that buyers and sellers have finding each other make the real estate market the least liquid of the markets we have discussed. Electronic multiple listing services have lowered trader search costs, but these costs are still very high. Clearing and settlement in real estate markets is also quite expensive because the trades usually are large, complex, and among traders who do not have standing credit relationships.

3.4.2 Stock Markets

Corporations apply to exchanges to *list* their stocks. Exchanges generally list all companies that meet their listing standards and that pay their *listing fees*. All but the smallest publicly traded stocks are listed for trading at one or more markets.

The *listing standards* of an exchange generally require that its listed companies meet specified minimum standards for capital value, numbers of shareholders, and financial strength. Most exchanges also require listed companies to report their accounts regularly according to *generally accepted accounting practices* (GAAP). Some exchanges also regulate the control structures of their listed companies. *Control structure* refers to how the shareholders elect the board of directors who appoint the managers and set

Double- and Triple-counting Volumes

The volume figures that markets report often are not directly comparable. Trading systems that match public buyers directly to public sellers generally report lower volumes than do trading systems in which dealers act as intermediaries between public traders. For example, a 100-share trade between a public buyer and a public seller creates 100 shares of volume at the NYSE. If the same trade took place in Nasdaq with the intermediation of a single dealer, the total volume would be 200 shares: 100 shares when the dealer bought from the public seller and 100 more shares when the dealer sold to the public buyer. Even greater volume results when more than one dealer is involved. If Dealer A buys from the public seller, Dealer B sells to the public buyer, and Dealer B buys from Dealer A, the market will report 300 shares.

Although both markets will accurately report their volumes, the reported figures will have different meanings. In markets that exclusively match public buyers directly to public sellers, volume measures only the trading activity of public traders. In dealer markets, volume measures the total trading activity of public traders and dealers. In such markets, volume provides only indirect—and sometimes highly inflated—information about the activity of public traders.

Some markets also count volume that other markets report. For example, Nasdaq reports all volume that Nasdaq broker-dealers report. Some Nasdaq broker-dealers, however, run trading systems that separately match buyers to sellers. Their reported trading volume thus overstates total trading volume because they count the same trades twice.

The *World Federation of Exchanges* (WFE) classifies markets by how they count their volumes. *Trading System View* (TSV) markets count only transactions that pass through their trading systems or that occur on their trading floors. *Regulated Environment View* (REV) markets count all transactions that are subject to their regulatory supervision. The WFE classifies the NYSE as a TSV market and the Nasdaq Stock Market as an REV market.

company policy. The NYSE, for example, devotes considerable resources to regulating corporate control structures.

3.4.2.1 The U.S. Stock Markets

The exchange where a corporate stock issue is primarily listed is its *primary listing market.* The main primary listing markets in the United States are the New York Stock Exchange, the American Stock Exchange, and the Nasdaq Stock Market. Stocks listed at the New York Stock Exchange and the American Stock Exchange are known as *listed stocks.* Nasdaq stocks were once known as *over-the-counter* stocks, but now they are simply called Nasdaq stocks.

The New York and American stock exchanges have floor-based trading systems. Floor brokers arrange trades for their clients on the floor of the exchange, often with the assistance of dealers who are known as *specialists.* The Nasdaq Stock Market is an electronic communications network that allows brokers and dealers to meet each other in a screen-based environment managed by computers.

Most listed stocks in the United States also trade in one or more regional stock markets. The *regional exchanges* presently include the Boston

Stock Exchange, the Chicago Stock Exchange, the Cincinnati Stock Exchange, the Archipelago Exchange, and the Philadelphia Stock Exchange. Many more regional exchanges once existed, but after many mergers and failures, only these five remain. In addition to listed companies, the regional exchanges trade some Nasdaq stocks under *unlisted trading privileges* granted to them by the U.S. Securities and Exchange Commission.

U.S. exchange-listed stocks also trade in the *third market*. The third market includes dealers and brokers who arrange trades in exchange-listed stocks away from an exchange. These dealers typically display their quotes on the Nasdaq Intermarket.

Finally, U.S. stocks also trade in various electronic trading systems known as *alternative trading systems* (ATSs). Registered broker-dealers sponsor most of these systems. *Electronic communications networks* (ECNs) are the best-known alternative trading systems. Many alternative trading systems are essentially electronic exchanges. The term *fourth market* refers to trading in exchange-listed stocks within these systems. A summary of the U.S. equity markets appears in table 3-5.

TABLE 3-5.
Some U.S. Equity Markets with 2000 Total Dollar Volumes (billions)

MARKET TYPE	EXAMPLES	DOLLAR VOLUME	QUOTATION SYMBOL
Primary listing markets	New York Stock Exchange	11,060	N
	American Stock Exchange	945	A
	The Nasdaq National Market	20,274	Q
	The Nasdaq SmallCap Market	122	S
	OTC Bulletin Board Service	101	U
	National Quotation Service Pink Sheets	20	
Regional markets	Boston Stock Exchange	258	B
	Chicago Stock Exchange	1,190	M
	Cincinnati Stock Exchange	173	C
	Pacific Exchange	157	P
	Philadelphia Stock Exchange	80	X
Third market dealers	Madoff Investment Securities	1,000+	MADF
	Knight Trading Group	1,000+	TRIM
Third market brokers	Jefferies Group	NA	JEFF
	ITG	NA	ITGI
Electronic communications networks (ECNs)	Archipelago	777	ARCH
	BRUT ECN	NA	BRUT
	Instinet	3,336	INCA
	Island	3,449	ISLD
	REDIBook	NA	REDI
Other alternative trading systems	POSIT	335	
	Global Instinet Crossing	NA	
	Arizona Stock Exchange	0.2	

Sources: Exchange fact books and personal correspondence. Some data are not available for proprietary reasons.

Communist Party Headquarters

Poland emerged from behind the Iron Curtain in 1989. The government almost immediately reorganized the Warsaw Stock Exchange, which had closed in 1939 following Hitler's invasion of Poland. The new exchange reopened for trading in 1991.

The government first housed the Exchange in the former Communist Party Headquarters Building. This site was attractive both for its symbolic value and for its telecommunications infrastructure, which was the best in Warsaw.

3.4.2.2 International Stock Markets

In the late twentieth century, stock markets throughout the world grew substantially as firms increasingly sought public equity financing instead of bank loan financing and as governments privatized various enterprises. Many exchanges consolidated to take advantage of economies of scale.

Almost all the former Communist countries have established stock exchanges. They often created these exchanges before they had stocks to trade, property and bankruptcy laws to define who owns what, and securities laws to regulate issuers and traders. Despite these deficiencies, these countries established stock exchanges because they are symbols of free market economies. Not surprisingly, the most successful of these markets are in countries that carefully defined property rights, privatized most of their government-run enterprises, adopted good securities laws, and diligently enforced those laws.

Table 3-6 presents a summary of trading activity in the larger national stock markets. Not surprisingly, trading is most active in countries with strong market-based economies.

3.4.3 Equity Options Markets

3.4.3.1 U.S. Markets

Five exchanges in the United States presently trade standardized equity and index option contracts. The Options Clearing Corporation (OCC) is the clearinghouse for all contracts that trade at these exchanges. Buyers therefore can buy contracts at one exchange and sell them at other exchanges to offset their positions. The most actively traded option contracts trade at all of the exchanges. A list of these exchanges appears in table 3-7.

Four of the five options exchanges employ floor-based trading systems. Each of these exchanges also employs automated systems to support their dealers and floor brokers. The International Securities Exchange, formed in 1997, started trading in 2000 with a completely automated trading system. Its market share has grown very quickly.

Investment banks also trade specialized option contracts *over the counter* (OTC) with their clients. These contracts usually have strike prices, maturity dates, settlement terms, or other features that are different from the standardized options available at the exchanges. This business is part of the *synthetic derivatives business.* Synthetic derivatives also include other *structured products*—primarily swaps—that investment banks create for their clients.

3.4.3.2 International Equity Derivatives Markets

Exchange-traded equity derivatives include stock option contracts, equity index option contracts, equity index futures contracts, options on equity index futures contracts, and futures on individual stocks. Table 3-8 provides a characterization of organized trading in equity derivatives throughout the world.

Outside of the United States, most organized trading in standardized stock option contracts takes place at the same exchange at which the underlying stocks trade. In the United States, the SEC has not permitted equities and their associated options to trade side by side. When they trade at the same exchange, they generally trade in different rooms.

Most organized trading in equity index futures outside of the United States also takes place at the same exchange at which the underlying stocks trade. In the United States, these contracts trade on futures exchanges.

TABLE 3-6.
Trading Activity in Some International Stock Markets (2001)

TIME ZONE	EXCHANGE	VOLUME REPORT TYPE	DOLLAR VOLUME (BILLIONS)	NUMBER OF LISTED FIRMS	YEAR-END TOTAL CAPITALIZATION (BILLION DOLLARS)	ANNUAL TURNOVER RATE
North America	Amex	TSV	817	605	60	NA
	Mexico	REV	70	172	126	34%
	Nasdaq	REV	10,935	4,128	2,897	388
	NYSE	TSV	10,489	2,400	11,027	88
	Toronto	TSV	460	1,316	615	72
South America	Buenos Aires	TSV	8	119	33	16
	Santiago	TSV	4	250	56	9
	São Paulo	TSV	65	429	186	36
Europe, Africa, & Middle East	Athens	TSV	38	314	85	48
	Copenhagen	REV	72	217	85	80
	Deutsche Börse	TSV	1,440	984	1,072	120
	Euronext	REV	3,180	1,345	1,844	165
	Helsinki	TSV	182	155	190	84
	Irish	TSV	23	87	75	28
	Istanbul	TSV	78	310	47	174
	Italy	TSV	710	294	527	113
	Johannesburg	TSV	70	519	147	33
	Lisbon	TSV	28	99	46	63
	London	REV	4,551	2,891	2,150	76
	Madrid	REV	842	1,482	468	187
	Oslo	REV	62	214	69	88
	Stockholm	REV	387	305	237	111
	Switzerland	REV	594	412	527	86
	Tel-Aviv	TSV	16	649	58	30
	Valencia	TSV	41	508	NA	12
	Vienna	TSV	8	113	25	31
	Warsaw	TSV	10	230	26	53
Asia & Pacific	Australian	TSV	244	1,410	375	61
	Hong Kong	TSV	241	867	506	47
	Jakarta	TSV	10	315	23	35
	Korea	TSV	381	688	194	218
	Kuala Lumpur	TSV	21	807	119	19
	New Zealand	TSV	10	195	18	51
	Osaka	TSV	175	1,335	NA	9
	Philippine	TSV	3	232	21	16
	Singapore	TSV	72	386	116	56
	Taiwan	TSV	545	586	293	212
	Thailand	TSV	31	382	36	74
	Tokyo	TSV	1,661	2,141	2,265	57

Source: World Federation of Exchanges website at www.world-exchanges.org.

Note: Trading System View (TSV) markets count only transactions that pass through their trading systems or that occur on their trading floors. Regulated Environment View (REV) markets count all transactions that are subject to their regulatory supervision. Dollar volumes include investment funds. The number of listed firms includes both domestic and foreign listings and excludes investment funds. Total capitalization includes only domestic companies and excludes investment funds.

Some International Stock Market Trivia

Teléfonos de México, S.A. de C.V. (Telmex) is the largest Mexican stock issue. The New York Stock Exchange, however, has a greater share of its worldwide trading volume than does the Bolsa Mexicana de Valores.

By capitalization and trading volume, the largest Israeli stock market is the U.S. Nasdaq Stock Market. Many high-tech Israeli companies do not list their shares at the Tel Aviv Stock Exchange.

The Stock Exchange of Hong Kong uses an electronic trading system to match buyers to sellers. However, until recently, the Exchange required its members to sit in the Trading Hall of the Exchange to trade. The Trading Hall is a large room filled with members and their clerks, seated at desks upon which sit computer screens and telephones. Members now also can trade through off-floor trading devices in their offices.

Chinese law requires that all trading in securities listed at the Shanghai Stock Exchange take place at the Exchange, and all shares held by domestic traders (A class shares) remain on deposit at the Exchange's depository. Domestic traders who wish to trade at the Exchange must deposit funds with their brokers before trading. Since all money and securities are on deposit before the Exchange arranges any trade, the broker can refuse to accept orders that would produce trades which traders cannot settle immediately. Although the Exchange once settled its A share trades on the day of the trade, it now settles them on the next day (T+1). The Shenzhen Stock Exchange uses similar procedures.

Some Options Market Trivia

The Chicago Board Options Exchange (CBOE) began trading in 1973 as the first organized equity options exchange. Although it is a Chicago Board of Trade subsidiary, it is independently governed, operated, and regulated.

The New York Stock Exchange, the Midwestern Stock Exchange (now called the Chicago Stock Exchange), and Nasdaq also created organized options markets. These markets were not notably successful. The NYSE sold its options market to the CBOE in 1997. The Midwestern Stock Exchange and Nasdaq simply closed their options markets.

The Securities and Exchange Commission has not approved *side-by-side trading* of stocks and their associated options at the same exchange. Exchanges that trade stocks and their associated options must physically separate the stock trading from the options trading.

FLEX Options

To capture institutional business in specialized options, the options markets developed *FLEX Options* (FLexible EXchange) for indexes and E-FLEX Options for equities. Using a special *request for quote* (RFQ) procedure, institutional traders specify the option type (call or put), strike price, maturity date (up to three years distant), and exercise style (American or European) for the option contract in which they are interested. Exchange market makers then quote the option in a competitive environment. The Options Clearing Corporation is the issuer and guarantor of all FLEX and E-FLEX contracts, as it is for all other options traded at U.S. exchanges.

TABLE 3-7.
U.S. Equity Options Exchanges and 2001 Total Contract Volumes (millions)

		CONTRACT VOLUME		
EXCHANGE	NICKNAME	EQUITIES	INDEXES	QUOTATION SYMBOL
Chicago Board Options Exchange	CBOE	254	52	CO
American Stock Exchange	Amex	204	1	A
Pacific Exchange	P-Coast	103	—	P
Philadelphia Stock Exchange	Philly	96	5	X
International Securities Exchange	ISE	65	—	I

Source: The Options Clearing Corporation 2001 Annual Report, *p. 3, at www.optionsclearing.com/about/ann_rep/ann_rep_pdf/annual_rep_01.pdf.*

TABLE 3-8.
Contract Volumes in Some World Equity Derivatives Markets in 2000 (thousands)

TIME ZONE	EXCHANGE	STOCK OPTIONS	INDEX OPTIONS	INDEX FUTURES	STOCK FUTURES
North	AMEX (USA)	205,716	1,998	NT	NT
America	CBOE (USA)	281,182	47,387	NT	NT
	CBOT (USA)	NT	200	3,572	NT
	CME (USA)	NT	5,089	59,957	NT
	ISE (USA)	7,716	NT	NT	NT
	Montreal SE (Canada)	4,753	89	1,272	NT
	PHLX (USA)	73,021	2,607	NT	NT
	PSX (USA)	108,990	1	NT	NT
South	BOVESPA (Brazil)	30,295	414	NT	NT
America	MMD (Mexico)	NT	NT	49	17
Europe, Africa &	Athens (Greece)	NT	NT	913	NT
Middle East	EUREX (Germany)	89,238	44,200	NT	31,595
	Euronext Amsterdam	47,107	4,531	2,479	349
	Euronext Brussels	589	1,693	29,519	NA
	FUTOP (Denmark)	4	11	989	NT
	MEFF (Spain)	16,586	766	4,183	NT
	OM (Sweden)	30,692	4,167	11,477	2,145
	Wiener Börse (Austria)	839	205	431	
	TASE (Israel)	NT	26,974	122	NT
Asia &	ASXD (Australia)	9,508	NT	NT	437
Pacific	HKFE (Hong Kong)	4,189	550	4,178	3
	KLOFFE (Malaysia)	NT	349	367	NT
	Korea SE (S Korea)	NT	193,829	19,667	NT
	NZFOE (New Zealand)	65	NT	1	NT
	Osaka (Japan)	104	5,717	8,708	NT
	SFE (Australia)	NT	1,099	3,825	9
	Singapore Exchange	NT	710	8,461	NT
	Taiwan Futures Exchange	NT	NT	1,927	NT

Source: World Federation of Exchanges website at www.world-exchanges.org
Notes: NT = not traded; NA = not available
Since contract sizes vary substantially both within and among exchanges, the contract volume data do not permit fine comparisons among exchanges.