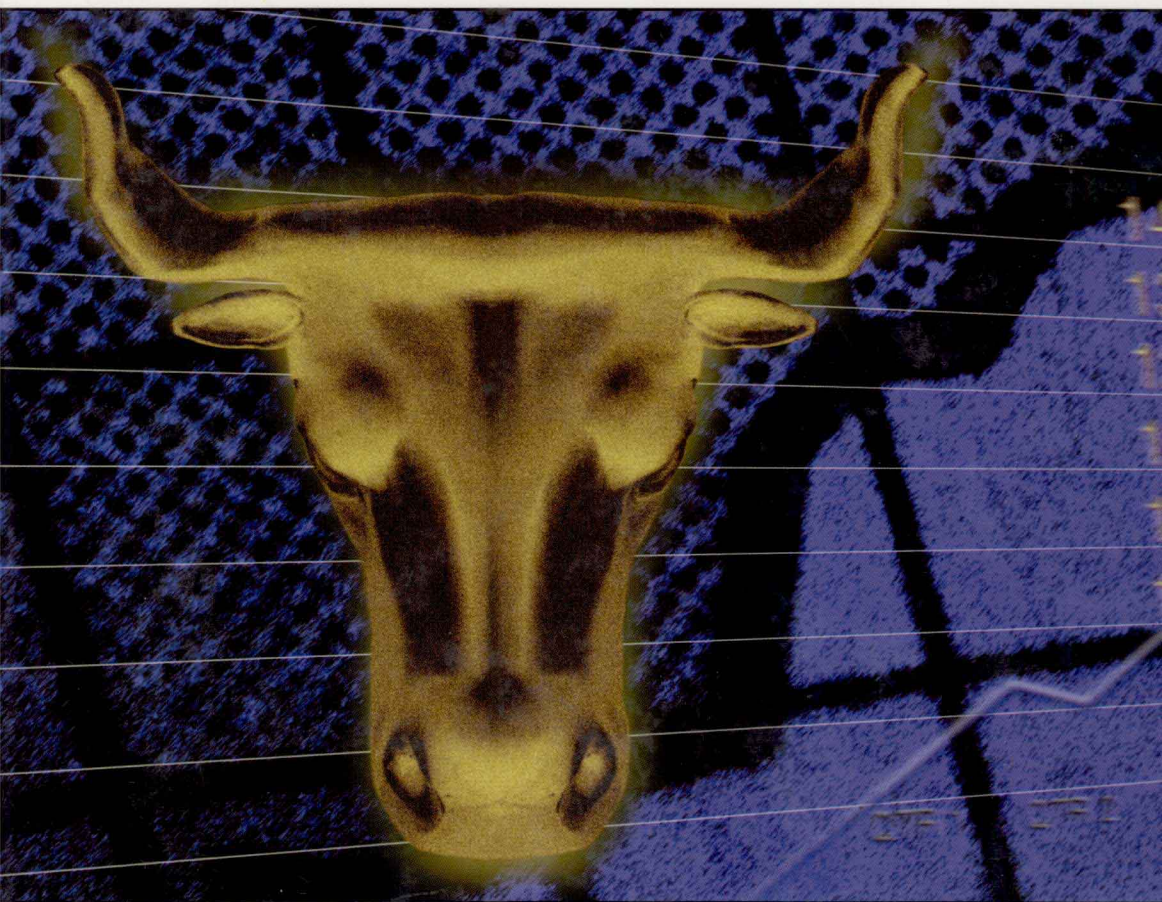


# FUTURES and OPTIONS MARKETS

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An Introduction



Colin A. Carter

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Colin A. Carter

*University of California, Davis*



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# PREFACE

Futures and options markets are globally linked through round-the-clock computerized trading, and this booming derivatives industry has led the world economy in the recent globalization trend. This book highlights the economic role of futures and options markets in the new global economy and explains how these markets evolved to better serve a more integrated world economy. Starting from the fundamentals of commodity futures, this book advances the reader through the exciting development of financial futures and options, including currencies and equity indexes. The commodity contracts have historical significance and provide a foundation for understanding price formation in the most modern financial futures and options markets—the future of the industry. Using economics logic rather than complex mathematics, this book brings the futures and options markets to life by explaining how and why these markets function and how they are used to manage market risk and as speculative investments.

Futures and options markets are the epitome of the global competitive marketplace. I have been interested in futures and options markets for many years and I have studied and traded these markets with enthusiasm and respect for the advantage of the marketplace. Futures and options markets provide a wonderful laboratory to allow students to see economic theory in action. The markets swiftly react to world news events that serve as either a supply or demand shock. The importance of futures and options markets in the global economy has grown remarkably and the industry remains highly dynamic and exciting. Despite the economic importance of futures and options markets, there is a surprisingly high level of ignorance among the public and the media regarding the functioning and economic benefits of these markets. Myths abound regarding the riskiness and undesirability of trading futures and options contracts, yet the volume of trade on these markets continues to expand year after year. As a result of the growth in this industry, more and more universities are beginning to introduce courses on futures and options markets. With the writing of this book, I hope to make a contribution to furthering the understanding of these vital markets.

This book is written as a textbook for an upper level undergraduate course in futures and options markets taught in schools of business, economics, or agricultural and applied economics. Students in an MBA program are also a target audience, as are professional financial planners, and money managers. The objective of this book is to provide an economic understanding of the development and operation of futures and options markets. This book presents an integrated explanation

of the market institutions, theory, and <sup>empirical</sup> evidence. It provides the reader with an <sup>smart</sup> intuitive explanation of the complicated nature of futures and options markets. The material in this book is presented in a way that is accessible to students with training in economics, mathematics, and statistics at the principles level. Mathematics and formulas are kept to a minimum in this book because it is meant to be introductory material.

I have attempted to make the material interesting and easy to understand. Numerous real-world examples are provided explaining how <sup>profession</sup> practitioners use futures and options markets. A section on market efficiency is included to explain the efficiency <sup>argue</sup> debate. An <sup>a lot of</sup> extensive listing of Internet sites is provided to allow students to keep current with the market and access real data. Discussion questions and problems are offered to <sup>become active</sup> stimulate students to think about the topics at hand and allow them to test their understanding of the material presented. In addition, each chapter has key references to academic literature that provides the more sophisticated reader with suggestions for more advanced reading.

This book has a <sup>different</sup> distinctive blend of material relating to options, futures, commodities, and financials. It is more general than most futures and options textbooks—for instance, it gives equal treatment to commodities and financials. The chapters on fundamental and technical analysis are somewhat unique, as most textbooks on this topic do not have such chapters. The <sup>explain</sup> illustrative examples and text boxes are aimed to make the material user friendly to students who are new to this topic.

This book is designed for a one-semester course and students should easily be able to get through the entire book in one semester. Although the material is difficult in places and intellectually challenging, I hope you find it worth the effort.





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# CHAPTER

# 1

## *The Market*

*Ken Roberts says the commodities markets are a <sup>a gust of wind</sup>blast! There is too much fun and too much profit for anyone with a dream not to <sup>take hold of</sup>grab a share.*

—Worth magazine, October 1997

*I have never, ever been in the futures market myself; I don't have the skill for it.*

—Philip Johnson, quoted in the *Wall Street Journal*, April 29, 1983

Who are these two guys? Ken Roberts is a former Amway salesman who wrote a popular book on how to trade commodities. Roberts's book promotes trading strategies and systems to people new to futures trading, and he reportedly made over \$50 million selling his book through the mail. Philip Johnson is a former chairman of the **Commodity Futures Trading Commission (CFTC)**, the U.S. government agency that regulates and oversees the futures industry. Johnson is a lawyer and an expert on commodity law who wrote a <sup>book</sup>treatise on commodities regulation.

It is <sup>varied</sup>diverse attitudes like those of Roberts and Johnson that give the futures industry an exciting <sup>taste</sup>flavor. Someone as knowledgeable as Johnson believes that speculating, or participating in the futures market with the sole intention of making a profit, is too risky (we discuss speculating in a later chapter). In all likelihood, he knows that the futures market is close to being efficient and that there is no reason to believe there is easy money to be made in trading futures. On the other hand, Roberts throws caution to the wind and tells his clients there is effortless money to be made. In fact, this works for Roberts. He sells a lot of books because the <sup>plan</sup>industry attracts a small percentage of investors who believe in get-rich-quick schemes, like the Ken Roberts formula. Most of these naive investors <sup>last</sup>ultimately lose money speculating in the futures markets. People like Roberts get rich from selling moneymaking ideas to novice traders, not necessarily from trading according to their own systems. <sup>priest</sup>  
<sup>border</sup>

The get-rich-quick gurus are a fringe group in the industry and the only group that claims to hold the secrets as to how to beat the market gods. The majority of

**BOX 1.1*****In <sup>clear</sup> plain English, what are futures and options?***

Both futures and options are types of financial derivatives. Derivatives have recently become very important in the financial world, and the derivative business has flourished, but what exactly does the term <sup>include</sup> encompass? Strictly speaking, a derivative is a financial contract the value of which is derived from or linked to the value of an underlying equity (e.g., common stock), bond, index (e.g., Standard and Poor's 500 stock index), or commodity. A derivative is usually a contract, which is nothing more than an agreement between two parties.

Sometimes, the general public mistakenly views derivative trading as legalized gambling. This is unfortunate because derivatives provide the commodity and financial world with a relatively inexpensive way of controlling risk. Derivatives are not a new idea. In fact, one of the earliest derivatives was money, which for many centuries was tied to the value of gold.

A futures contract is an obligation to buy or sell a specific quantity and quality of a commodity or financial instrument at a certain price on a specified future date. Futures contracts are standardized and traded on organized exchanges. Options, on the other hand, give the buyer (seller) the right to buy (sell) futures contracts; but unlike futures, there is no obligation.

traders in the industry make no such claims. This majority includes producers and processors of primary products, such as mining companies, oil companies, farmers, food processors, and multinational food dealers. This group also includes banks, airlines, insurance companies, mutual fund managers, and multinational firms trying to cope with price risk, exchange rate risk, or other forms of financial risk. Many of these firms participate in the futures market in order to shift some of the risk of price fluctuations onto other traders. In other words, their motives for trading are dissimilar to those of Roberts's <sup>followers</sup> disciples, who seek to profit from price fluctuations.

This book devotes very little attention to the colorful fringe of small speculators who believe in get-rich-quick schemes. Instead, it presents institutional background on futures and options markets and focuses on the economics of the markets and the economics of ~~hedging~~ <sup>hedging</sup>, which entails participating in the futures or options market to ~~neutralize~~ <sup>stop having an effect</sup> the effects of commodity or financial price risk. Hedging is another important topic we discuss in later chapters. The topics presented in this book were chosen with the objective of providing the reader with an understanding of and appreciation for the economic principles that underlie futures and options markets and the market participants. This book does not survey in detail the academic literature on futures and options markets, but extensive academic literature on the topic is surveyed by Carter (1999), Malliaris (1997), and Williams (2001).

Despite its size and growing economic importance, the futures and options industry remains poorly understood because many view it as a set of derivative markets that are far too complicated and too risky. However, futures and options

## BOX 1.2

### **What is the probability of turning \$1,000 into \$100,000 in just 10 months of futures trading?**

The correct answer is that this feat is virtually impossible, unless you are Hillary Clinton. Clinton made international headlines with her amazing speculative profits in cattle futures contracts. Her ability to trade futures contracts became an issue when her husband was running for president of the United States. According to press reports, Mrs. Clinton started trading commodities in 1978 on the Chicago Mercantile Exchange (CME). Somehow, she was able to turn her initial investment of \$1,000 into \$100,000 after just 10 months of trading.

A study by Anderson and Jackson investigated the odds of generating a 100-fold return in the cattle futures market. They found the probability is one in approximately 31 trillion. Clinton's cattle futures trades were also studied by Leo Melamed (1996), a former chairman of the CME. He found that in all likelihood most of her profits came from larger trades ordered by someone else and then shifted to her account. It is possible that her broker had two "mirrored" accounts, with one account buying cattle futures and the other selling cattle futures. After the trades were completed, the profitable trades could be credited to one account and the losses to the other.

For further reading, see Anderson and Jackson (1994).

markets have many characteristics in common with other markets. Using a very broad definition, a market is a place or situation that puts sellers and buyers in communication with one another, discovers prices, and facilitates ownership transfer. This applies to local street markets in Beijing or San Francisco as well as to futures markets in Chicago, New York, London, and Tokyo. In general, one important economic function of markets is to add time "utility" to a commodity or financial asset. The important role provided by futures and options markets is the provision of the time dimension, which permits buyers and sellers to conduct transactions calling for fulfillment at some future date. This is accomplished using very specific rules and regulations governing trading, that are laid down by the exchange bylaws. These rules, the exchange's highly centralized nature, and the standardized characteristics of futures and options contracts make futures and options markets unique compared to other markets.

Forward (or deferred delivery) contracts are familiar to most people. A forward contract is a contract calling for the future delivery of an item or a service at a specified price and at a set time period. If you buy an airline ticket for travel to see your family over Thanksgiving, this is a forward contract between you and the airline. You agree on a price today, but the transportation service and peanuts will not be provided until some future date. An apartment lease is a forward contract. In most college towns, the tenant signs a one-year lease with the landlord, and this constitutes a type of forward contract. In the financial and commodity

world, forward contracts are very common. But forward contracts are nonstandardized and are not traded on organized exchanges. A futures contract is nothing more than a forward contract that happens to be traded on an organized exchange, which means that it is standardized.

Day-to-day changes in futures prices affect day-to-day changes in cash (or spot) prices and vice versa. This means that firms or individuals affected by price activity in the underlying cash commodity or financial instrument are indirectly affected by price activity in the futures (and options) market. This is true whether or not these firms or individuals use the futures and options market directly. For instance, as a result of the recent changes in U.S. farm policy, farmers in the United States have become more dependent on supply and demand in both the cash and the commodity futures markets because the government no longer supports the farmgate prices. Even if a farmer does not trade directly on the futures market, the local cash price fluctuates daily along with the price changes in the futures market. There is a high degree of correlation between local cash prices and futures prices.

Following deregulation in the electricity market in many parts of the United States, utility companies have become more dependent and knowledgeable regarding electricity cash, forward, and futures markets. The growing importance of contingent markets (i.e., futures and options markets) is also spreading internationally. This means that prices determined by futures markets affect production and consumption decisions of individuals and firms in every corner of the world.

A primary function of futures (and options) markets is the discovery of prices, and these prices ration available supplies. If the weather is expected to turn bad in northern China, the price of wheat on the Chicago futures market will most likely rise on the basis of this news. This price rise signals to the world a possible reduced supply of wheat. Futures and options markets permit this type of supply shock to be transmitted across prices for both near-term and future settlement.

Prices of products ranging from soybeans to gasoline to foreign currencies are determined in futures and options markets. Contracts traded on the futures and options markets fall into four categories of products: (a) agricultural commodities<sup>1</sup> (e.g., corn), (b) metals (e.g., silver), (c) natural resources (e.g., crude oil), and (d) financial instruments (e.g., the European Euro). More than 200 different futures contracts (representing about 75 different commodities/financial instruments) are actively traded on North American markets alone. In addition, there are more than 100 different options contracts traded in North America (see Appendix Table 1.A1). In the United States, there are presently 10 different organized futures and options markets (exchanges) in operation (these are listed in Appendix Table 1.A1 along with trading volume). The largest U.S. exchanges are located in Chicago and New York. Outside the United States, there are over 40 exchanges, with several operating in Japan and Europe. Futures traders can buy and sell silk futures in Japan, stock index futures in London or Chicago, white maize futures in South Africa, copper futures in London, coffee futures in New York, treasury bond futures in Chicago, canola futures in Canada, and cotton yarn on the Osaka Textile Exchange.

<sup>1</sup> The group of commodities known as the "soft" commodities is composed of food and fiber items that include cocoa, sugar, coffee, orange juice, cotton, and lumber.



**BOX 1.3*****World's top futures and options markets.***

The United States once dominated the futures industry, but this is no longer true because of a tremendous boom in trading on foreign futures and options markets. The commodity and financial volatility of the 1970s brought international attention to futures markets as a mechanism to manage risks. The growth in overseas futures markets was due largely to the initial success of similar markets in the United States. It is also the case that traders based in the United States are active buyers and sellers in overseas futures markets. In the mid-1980s, overseas futures trading volume was approximately 25% of that in the United States. By the early 1990s, this gap closed quickly, with overseas volume equaling about 75% of U.S. volume. Trading volume on non-U.S. exchanges exceeded that on U.S. exchanges by the mid-1990s. Of the 10 busiest futures and options exchanges in the world, only four are in the United States.

**2001 FUTURES AND OPTIONS EXCHANGE VOLUME**

<i>Exchange</i>	<i>(in million contracts)</i>
1. <u>Korea Stock Exchange</u>	854.8
2. <u>Eurex</u>	541.6
3. <u>Chicago Mercantile Exchange</u>	411.7
4. <u>Chicago Board of Trade</u>	260.3
5. <u>LIFFE, UK</u>	205.0
6. <u>Paris Bourse (Euronext)</u>	149.3
7. <u>New York Mercantile Exchange</u>	103.0
8. <u>Brazilian Mercantile and Futures Exchange</u>	97.9
9. <u>Chicago Board Options Exchange</u>	74.0
10. <u>London Metal Exchange</u>	59.4

Source: Futures Industry Association.

Note: Volume data excludes options on individual equities.

In addition, <sup>boat shipping</sup> "barge freight" futures are traded on the Merchants' Exchange of St. Louis, an electronic exchange. This is one of the few active futures contracts based on a service. It has been traded since 2000 and is used as a hedging device by international commodity merchants.

## **MARKET PARTICIPANTS: HEDGERS, SPECULATORS, AND ARBITRAGEURS**

The major participants in futures and options markets are classified as hedgers, speculators, and arbitrageurs. In many cases, the individual traders are not members of the exchange. Therefore, they must execute their buy and/or sell orders

through a member broker. A **broker** is a person or firm that handles futures and options trades on the floor of the exchange for a nominal commission fee. A **hedger** is a person or corporation that transacts business in the underlying commodity or financial instrument specified in the futures contract. For commodities, this classification includes oil and mining companies, energy companies, farmers, grain companies, cattle feeders, and so on. Banks, trust companies, mutual funds, insurance companies, and construction companies are typical hedgers in the financial futures market. Hedgers trade futures and options in order to reduce <sup>in public</sup> exposure to price fluctuations. By taking a position in the futures (options) market that is opposite their underlying cash position, they can reduce the risk of price variability. In other words, they take a position in the futures or options market in order to offset risk in their underlying business. Hedging is not necessarily conducted for profit but rather to reduce price risk in the underlying asset market.

Hedging is not much different from buying other forms of insurance. For example, a wheat farmer can purchase insurance against the loss of a crop due to <sup>unusually</sup> a <sup>storm</sup> ~~freak~~ hailstorm. In fact, almost every risky aspect of this business is insurable except product price risk. The reason for the “missing” insurance market is very simple. An insurance company could not afford to offer a price insurance policy to wheat farmers for a reasonable price because during a year of low prices, every client would make a claim. The probability of a single wheat farmer being adversely affected by low prices is not independent from the same event affecting other wheat farmers. For the same reason, earthquake insurance is <sup>too dear</sup> prohibitively expensive for residents of San Francisco. If there is one claim due to an earthquake loss, there will be hundreds of thousands of claims. The pooling of independent risks is not <sup>very</sup> effective (and is therefore costly) for earthquake insurance, but it is not even <sup>possible</sup> ~~feasible~~ for commodity and financial asset prices. However, futures and options markets serve this important function: they facilitate the transfer of price risk from hedgers to speculators.

On the other hand, futures and options market **speculators** do not normally buy or sell the underlying physical commodity or financial instrument during the normal course of their business activities. They assume the price risk from hedgers and seek to profit from price variability. A futures or options market would be very difficult (or even impossible) to operate without the risk-absorbing service that speculators provide. If a hedger wishes to buy or sell a futures contract, speculators are usually willing to take the other side of the transaction. The risk of price fluctuation is thereby transferred from the hedger to the speculator. The same is true with options on futures.

In addition to outright speculators and hedgers, there is a subclassification of speculators called **arbitrageurs**. These individuals or firms often take very short-term positions in the market, seeking to take advantage of market anomalies. They <sup>at the same time</sup> ~~simultaneously~~ buy and sell futures (or options) contracts in order to profit from a <sup>discrepancy</sup> ~~discrepancy~~ in price relationships. Arbitrageurs are invaluable in terms of “making” a market because they often provide needed liquidity and their buying and selling (i.e., arbitrage) activities enhance the pricing efficiency of the futures market. An arbitrage opportunity is a risk-free profit opportunity. It is often said that there is no “free lunch” in the markets. But arbitrageurs are constantly on the lookout for a “free

lunch" (e.g., when relative prices for two different futures contracts display an abnormal relationship), and if they find a "free lunch," they quickly exploit it. Three-way arbitrage opportunities also exist among the cash, futures, and options markets.

Given that futures and options trading is a zero-sum game (i.e., aggregate profits equal aggregate losses), there is much debate as to whether speculators consistently earn profits from hedgers. Whether hedgers pay a significant insurance premium to speculators is very difficult to determine empirically. However, in the 1960s, Rockwell found that, as a group, speculators do not earn a large insurance payment from hedgers. In the 1980s, Hartzmark found that in aggregate speculators in some markets lose while hedgers have positive average returns. This is not to say that in certain markets and at certain times an insurance premium does not exist, whereby speculators earn the premium in return for assuming the price risk.

## WHAT EXACTLY ARE FUTURES AND OPTIONS MARKETS?

A futures market is an organized marketplace where buyers and sellers come together to establish prices for deferred delivery of a specific commodity (e.g., gold or coffee) or financial asset (e.g., a U.S. Treasury bond or the Japanese yen). It is called a futures market because the price established today is for future delivery. Supply, demand, and expectations interact to determine futures contract prices. Futures traders buy and sell through a public open outcry bid-and-offer system or electronically through a computerized trading system.<sup>2</sup> The futures exchange sets all the specific rules and regulations governing trading except for the price. Prices are established in the trading pit (or through the electronic pits), where futures contracts are bought and sold. Futures markets have been a <sup>great</sup> tremendous growth industry, and they determine intertemporal prices for about 200 different commodities or financial assets. For instance, these markets help establish the world price of a barrel of crude oil, the price of frozen concentrated orange juice exported from Brazil, and the price of European Euros.

To introduce the basics of futures markets, it is useful to discuss in more detail the process of hedging. **Hedging** on a futures market entails taking either a buy or a sell futures position that is opposite to the position in the market for the physical commodity (i.e., the cash or spot market).<sup>3</sup> The hedger participates in the futures and cash markets simultaneously, as a buyer (seller) in one market, and at the

<sup>2</sup> The public outcry system conducted in trading pits on the exchange "floor" is the conventional method of trading futures and options contracts and remains the most common in the United States. However, computerized trading is growing in importance in Europe, Asia, and through U.S.-globally linked e-markets. "Floorless" trading may have cost advantages over the old-fashioned trading pit because computers can automatically execute orders once bid and ask prices match. The Chicago Board of Trade uses the Eurex electronic trading system, and the Chicago Mercantile Exchange uses the Globex electronic platform.

<sup>3</sup> The terms *cash market* and *spot market* are sometimes used interchangeably in this book. Technically, there is a subtle difference, with *cash* meaning *now* and *spot* meaning *here*. Spot usually refers to a cash market price for immediate delivery.