CHAPTER 1

THE BASICS OF COMMODITY FUTURES

Trade in commodity futures contracts via the organized exchanges currently seen in the United States goes back to the 1860s. The basic concept is much older. There are records of trade in contractual obligations, similar to the modern day futures contracts, in China and Japan in earlier centuries.

The current widespread and growing interest in commodity futures emerged during the 1970s. Extreme price variability in the grains, oilseeds, fibers, and livestock commodities brought with it a sense of urgency and a need for mechanisms to manage exposure to price risk. Instability in the economy late in the decade and into the early 1980s brought double-digit inflation, a prime interest rate that exceeded 20 percent, and widespread uncertainty. Farm policy moved away from approaches that pegged specific prices for key agricultural commodities and toward a posture that would allow U.S. prices to move with the world market. The instability and uncertainty gave impetus to trade in futures contracts for such diverse items as the agricultural commodities, treasury bills, lumber, foreign currencies, copper, and heating oil.

There is little reason to expect the variability, instability, and related exposure to price risk to disappear. Increasingly, commodities produced and processed in the U.S. are bought, sold, and traded in a world market. That world-market exposure has been formalized during the 1990s by the North American Free Trade Agreement (NAFTA) and the world-level General Agreement on Tariffs and Trade (GATT). That worldwide involvement means the U.S. producer, processor, or handler is exposed to the uncertainties of weather, political unrest, and changing levels of exchange rates throughout the world. U.S. soybean producers and processors experienced a price range from $4.50 to $11.00 per bushel during the 1980s. Intrayear price moves in excess of $3.00 per bushel occurred five times during the decade.

During the 1990s, the price range has been from $5.14 to $9.03, with within-year price ranges well above $2.00 per bushel. In corn, the 1990s have seen a price range in futures from $2.04 to an extraordinary $5.54, and the range in cash prices in many domestic market areas has been even wider. With exposure to such price risk in soybeans, corn, and other commodities comes the need to understand trade in commodity futures and to develop the capacity to use futures and options on futures

effectively in managing exposure to that price risk. The need is on both sides of the ledger. The record corn prices of 1995 and 1996 brought a profit bonanza to farmers who had crops to sell, but they proved devastating to dairy farmers, livestock producers, and poultry firms who use corn as an important input. Clearly, there are pressing and growing needs for farmers to manage exposure to variable selling prices and equally pressing needs for users of agricultural commodities to manage exposure to variable costs. The financial integrity and economic well-being of the entire agricultural and agribusiness sector is at stake.

The objective of this book is to provide you with a working knowledge of commodity futures and options on futures. Emphasis will be on the agricultural commodities, but the concepts and applications will be relevant for any product or instrument for which futures are traded. Coverage starts at the basic level and then proceeds to the development of tools and techniques that provides all the potential user should need to develop and manage an effective program of price-risk management. Managing exposure to the increasingly volatile cash markets will be critically important to the viability of any business, farm or nonfarm, that is involved in the commodity business as we move toward the year 2000 and beyond.

In this initial chapter, emphasis will be on *what* is being traded, *why* trade in futures contracts exists, and how that trade is conducted. Coverage is very basic and is designed to answer questions the beginner tends to ask such as: What is being traded? Why is there no futures contract for some months? Why does trade in commodity futures protect against cash market price risk, and how does it work? Who trades futures, and why? What risks, if any, does the trader face if the risk of cash-price fluctuations is eliminated? How, if at all, does the futures market influence the cash market, or vice versa? What does trading futures cost? In the final analysis, who benefits from trade in futures?

Typically, as a beginner, you see the entire process as more complex and complicated than it really is. By covering the basics, the chapter removes some of the barriers to understanding and provides a base on which to build. You are encouraged to spend the time and effort needed on this chapter to get the basics down. Don't move forward from this chapter until your basic questions have been answered.

COMMODITY FUTURES: WHAT

A commodity futures contract is a legal instrument calling for the holder of that contract either to deliver or to accept delivery of a commodity on or by some future date. By definition, therefore, a commodity futures contract is what the terminology implies—a contractual obligation. When commodity futures are traded, it is this contractual obligation that is being traded. A trader who sells (goes short)[1] a commodity futures contract has incurred a legal and binding commitment to deliver that commodity, meeting the conditions explained in the contract, on or before a specified date. In trade jargon, "going short" means selling futures contracts. Conversely, a trader who buys (goes long) a commodity futures contract has incurred a legal and

[1]A listing of terms used in trading commodity futures is included as a glossary at the end of the book. As new terms are introduced in the text, each will be explained or illustrated, but you will be able to refer to the Glossary whenever review is needed or when the meaning of the term or concept is not apparent.

binding commitment to accept delivery of that commodity. The points or markets at which delivery can be completed are identified in the futures contract. Appendix 1A to this chapter lists widely traded futures, the exchanges on which they are traded, the size of the contracts offered, and related detail.

It is important for the beginning student of the markets to recognize that futures contracts can also be bought **or** *sold by a trader who has no position in the actual physical* **or** *cash commodity.* In particular, selling a commodity futures contract when you have no actual physical commodity on hand is not "selling something you do not have." An individual, partnership, or any other form of business operation always has a contractual promise or commitment that can be sold. Traders who are not involved with the cash commodity are called speculators and, as will become apparent later, they are essential to the operation of the futures markets.

A bit of perspective is important here. You need to focus on the basic issue involved. The futures market is related to the cash market, but is a separate market. As you move ahead, keep in mind that the reason there is a futures market is that producers, processors, and users have an interest in avoiding exposure to the risk of variable prices. This cash market risk, because there is a futures market, can be transferred to someone else. Keep this important point in mind.

Trade in commodity futures is the buying and selling of contractual obligations calling for future delivery of a specified commodity. Producers, processors, buyers, and others producing, trading, or using the physical commodity will be involved. These traders are called hedgers. But it is not necessary that all futures traders either possess or wish to possess the actual physical commodity. Traders called speculators who neither have nor wish to have a position in the actual commodity provide volume in the futures markets and contribute to the process of discovering a price for later time periods. The objectives of the hedgers and speculators are different, but both types of traders can be and are involved, and both types are important.

How Trade Is Conducted

Figure 1.1 provides a flow diagram of the actual mechanics of trade. Most of the communication required is by phone or developing communication systems such as the Internet. Traders contact their broker and place an order to buy or sell. The order is transmitted to the floor of the exchange in Chicago, New York, Kansas City, or some other city in the U.S. or around the world in which a futures exchange is located. The order is time stamped and passed on to a floor broker representing the brokerage firm that received the original order. Orders are usually still filled by an open outcry auction system. The floor broker "asks" a certain price if it is a sell order or "bids" a certain price if it is a buy order. If other brokers, representing some other client(s), have orders that allow them to buy or sell at the price the first broker is asking or bidding, a trade is completed. Each broker records the price and who bought or sold, and the trade is time-stamped and entered into the records of the brokerage firms involved.

All this sounds complicated, but it is not. What we have is just a process that keeps a record of when the order from the broker is received. This is the "time-stamp" feature. If there are orders to buy or sell at the same price, the orders must be filled or completed in chronological order based on the time they are received by the repre-

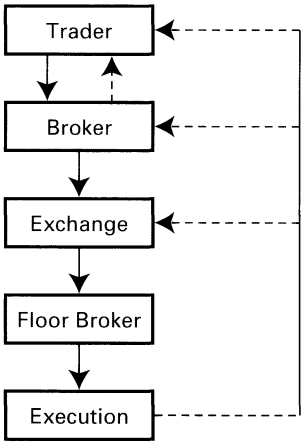

FIGURE 1.1
Flow Diagram for the Placing and Execution of an Order to Buy or Sell Commodity Futures

sentative in the trading pits. The "open outcry" feature is required. Trade is via a competitive auction, and the floor broker or other trader must "cry out" the willingness to buy or sell at a particular price. Hand signals are used to complement the verbal bids or offers in the often noisy trading pits. It is simply an auction where the buyers and sellers deal directly with each other.[2]

Figure 1.1 suggests there is a reverse flow of information to the trader through the broker or directly by mail. What the trader gets after the order is filled will vary across brokerage firms but will typically include

1. The date of the transaction;
2. A description of the transaction;
3. The price at which the transaction occurred;
4. The profit or loss from the trade if the transaction offset a position established earlier;
5. Commission charges if the transaction offset a position established earlier;
6. The account balance prior to this transaction; and
7. The account balance after the transaction.

The commission charges are simply the brokerage firm's charges for performing the trading service. The term *offset* indicates that the order eliminates a previously established position. For example, if corn futures were bought 10 days earlier, an order to sell the same quantity of corn futures contracts would offset *or* cancel the initial purchase.

If the order establishes an initial position in the futures, usually no commission charges are involved immediately. Commissions for trade in futures are charged after

[2]Responding to changing needs, some of the major exchanges are exploring and moving to trade via electronic networks. Such systems allow 24-hour access and trading from users around the world and will involve a departure from the traditional "open outcry" trading techniques. During the 1990s, there has been a tendency to move toward electronic and often computerized systems to handle the volume of trade needed and to make the overseeing and regulatory functions of regulatory agencies such as the Commodity Futures Trading Commission (CFTC) and the Security Exchange Commission (SEC) easier and more effective.

buy–sell or sell–buy transactions are completed (after a "round turn" has been completed). A round turn is a buy and later sale, or a sale and later buy, which eliminates any position or obligation in the markets. Buying 10 live cattle futures contracts on October 1 and selling 10 live cattle futures contracts on December 1 would complete a round turn, for example. The trader will now have no obligation in the futures market and commissions will be charged by the brokerage firm that handled the business. Some brokerage firms, you will find, "split" their commission charges on options. They charge part of the fee when the position is established, the rest when the position is closed out.

It is also after the round turn is completed that a profit or loss[3] will be added to, or subtracted from, the beginning account balance. You are encouraged to pause at this point and think about how selling at $3.10 and buying back at $2.85 can generate a profit. Also, think about how completion of a round turn eliminates any position in the markets.

Keep it simple for now. Selling futures means you have incurred an obligation to deliver a commodity on or by a later date. But the futures market is not intended to be a market that completes physical delivery. You will almost always want to offset the obligation to deliver by buying back an equal number of futures contracts before they mature. You will find this meets your objective of transferring the risk of price fluctuations to someone else and you can do it all with "paper" transactions. That is what the futures market is supposed to do.

Later chapters will address how to place an order with the broker, which type of order to use in a particular instance, and related detail. At this point, *it is sufficient for you to just understand that trade occurs via an open outcry and competitive auction process*. Since the prices that evolve from the auction process are so widely watched and widely used, it is useful to pause for a moment to reflect on how important it is that the futures market discover prices that accurately reflect the underlying supply–demand relationships.

Orders to buy or sell are filled on the floor of the futures exchanges by an open outcry and competitive auction process. The trader is represented by a broker whose job is to seek "fills" of the trader's orders. The resulting prices are highly visible and are widely used by decision makers as price expectations. You can avoid price risk in the cash market by buying and selling futures contracts in this related but separate market.

The Accounting Process

To be allowed to trade futures contracts, the trader must complete necessary forms supplied by the brokerage firm and deposit required "margin money." The forms essentially transfer the risk of, and responsibility for, any losses from the brokerage firm to the trader and are standard in format and content. The concept of margin money requires more explanation.

[3]A profit is earned if, for example, corn futures are bought at $3.10 and sold at $3.20. Conversely, a loss would be incurred if the futures were bought at $3.10, the market does not go up, and they later have to be sold at $2.85. Similarly, selling initially at $3.10 and buying back later at $2.85 would earn a profit. There will be profits in the futures trades if you can meet the old adage of "buy low and sell high," or "sell high and buy low."

There are two types of margin requirements. First, the *initial margin* sets out the minimum monies traders must have on deposit with their broker to trade one futures contract. Among characteristics of the initial margin requirements are the following:

1. The minimum initial margin is set by the exchanges on which the particular contract is traded. For example, the Chicago Board of Trade (CBOT) offers a soybean futures contract of 5,000 bushels of soybeans of a specified quality. The CBOT sets the minimum initial margin requirement for the soybean contract.
2. Initial margins have historically been set at 5 percent or less of the face value of the contract. A 5,000-bushel soybean contract at $8 per bushel has a value of $40,000. Applying a 5 percent rule, initial margin requirements per contract would be expected to be around $2,000. The margins can and do vary over time with a tendency for the CBOT or other exchange to raise the requirements when prices are volatile.
3. Brokerage firms can legally charge more than the minimum margin set by the exchange. They are not allowed to charge less if that particular exchange establishes minimum margin levels for a particular commodity.

The second type of margin is the *maintenance margin*. It specifies the minimum level at which the account must be maintained and becomes a threshold or trigger point to signal a "margin call" when the position the trader has established is losing money. The margin call requests additional money if the positions are to be kept in place. As a general rule of thumb, the maintenance margin requirement will be about two-thirds of the initial margin.

To illustrate the use of margins, let's assume we have speculators who hear about drought damage to the nation's corn crop and decide they want to trade corn futures. A broker is contacted, the necessary account forms are completed, and a speculator is told the margin requirements for a 5,000-bushel corn contract on the CBOT are $1,200 initial and $800 maintenance per contract.[4] Our speculator puts in an order to buy December corn futures at $3.50, and the order to buy at $3.50 is filled on July 2.[5]

Table 1.1 provides a chronological record of what could happen if the expectation that corn prices will go higher turns out to be wrong in the short run. It uses a single 5,000-bushel futures contract to illustrate.

On July 5, the December corn futures are at $3.40 at the close of trade—$.10 per bushel (bu.) below the $3.50 level at which the futures were bought. The trader has suffered an account loss of $500 (5,000 times $.10 per bu.). The account balance per contract is pulled down through the $800 maintenance level ($1,200 – $500 = $700) and a margin call of $500 would be issued to cover the losses and restore the $1,200 account balance. If the margin call is not answered and money is not sent to the broker within a prescribed time limit (three to four business days with many brokerage firms, but check with your broker), the trader's position can be liquidated, and the trader will have to absorb any losses.

[4]Many brokerage firms will require a minimum account balance and/or a certain level of net worth before they will open an account. This discussion of margins assumes any such beginning requirements have already been satisfied. Such up-front requirements are designed to ensure the trader will be able to handle any losses that might be incurred and will vary significantly across brokerage firms. You should check around for the best deal.

[5]The July 2 date was picked for illustrative purposes. Any date could have been used between the time trade in December futures contracts is started (often as early as August of the previous year) and the maturity date of the December contract during the third week of December.

Date	Price ($ per bu.)	Action	Margin Action	Balance ($)
		Initial margin = $1,200		
		Maintenance margin = $800		
July 2	$3.50	Buy December corn futures @ $3.50.		$1,200
July 3	3.46			1,000
July 4	Holiday			
July 5	3.40		$500 call	1,200
July 6	3.33			850
July 9	3.28		$600 call	1,200
July 10	3.31			1,350
July 11	3.38			1,700
July 12	3.40			1,800
July 13	3.47			2,150
July 16	3.56			2,600
July 17	3.66			3,100
July 18	3.70			3,300
July 19	3.71			3,350
July 20	3.75			3,550
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.	.		.	.
Sept. 21	$3.90	Sell December corn futures @ $3.90		$4,300

TABLE 1.1
Accounting for Margins and Margin Calls for a Long Position in December Corn, 50,000-Bushel Contract

The chronological record in Table 1.1 shows increasing margin requirements as prices decline and, after the market reverses and prices move higher, an accumulation of surplus in the account that could be withdrawn by the trader.[6] *You should spend some time regenerating the margin calls shown in the table.* It is important to understand, for example, why the price decline from $3.40 to $3.33 (July 5 to July 6) did not generate a margin call, but a margin call *is* subsequently generated by the $3.28 price on July 9. The $3.28 is $.12 below the July 5 level of $3.40 when the account balance was restored to $1,200, and the $.12 decline brings a $600 dip in the account balance. The $800 maintenance margin is penetrated ($1,200 – 600 = $600) again, and a margin call is issued for $600 to bring the account balance back up to $1,200.

The trader's account is updated daily using a "mark-to-market" approach. That is, the balance of the account is updated daily to reflect the market level in the form of the official settlement price for the futures contract for each day. If you check your newspaper, electronic market wire, or the *Wall Street Journal*, there is often a range of prices within which the market is trading at the close. The range is usually small, and the exchange has to pick a "settlement price" near the middle of that range for accounting and margin calculation purposes.

[6]Most brokerage firms will, if the trader prefers, transfer the surplus funds to an account earning money market rates. If the price levels subsequently decline and more margin funds are needed, the money can be transferred back to the commodity trading account to cover emerging margin needs. This eliminates the opportunity cost of funds being tied up with the brokerage firm and earning nothing when the trader does not have a position in the markets.

Note that traders do not pay the face value of the corn contract ($3.50 × 5,000 = $17,500) when they buy the contract. What traders deposit is the required margin. At the end of the trade, when the contract is sold at $3.90 on September 21, the round turn has been completed. The trader's account is then credited with the profit on the trade of $.40 per bushel and debited for the broker's commission charge, usually around $75 per contract for a round turn, or about $.015 per bushel. It should be noted here that the discussion of margins applies only to trade directly in futures. Trade in the relatively new options on futures either has no margin requirement or somewhat different requirements, depending on whether the user is buying or selling. This issue will be detailed in Chapter 7 on options.

It is after the round turn is completed that commissions are charged and the trader's account is credited (debited) with the profit (loss) from the trade. Prior to the completion of the round turn, the only money transferred is the initial margin, any added margin money going to the brokerage firm, or any excess margin coming from the brokerage firm to the trader. The money sent to the broker to answer margin calls is used by the brokerage firm to meet its margin requirements at the exchange. Selling the futures on September 21 eliminates the commitment to accept delivery of the corn as a buyer of corn futures.

Margins and margin requirements are often confusing to the beginner. Just keep in mind that only margins are required to trade, but that you are responsible as a trader for any losses. That responsibility suggests margin calls will have to be answered to keep the position in futures in place if the market trend moves against the initial position. Keep this basic need in mind and just remember: for a hedger looking to avoid price risk, the interest cost on margin money is just a small business expense.

Months Traded and Why

Futures contracts are not traded for each month. Appendix 1B to this chapter shows the months for which futures are traded for several widely traded agricultural commodities and selected other futures. Before proceeding, it is important that you understand why the futures exchanges establish trade in specific months and usually tend to resist requests to extend trade to each month of the year.

Even before any detailed examination of exactly how trade in futures allows transfer of cash-price risk, it should be clear to you that the markets must offer a high level of liquidity. Cattle feeders seeking protection against price risk on a pen of cattle they have just bought or portfolio managers of banks seeking protection against rising interest rates must have confidence they can buy or sell the needed futures without delays. There must be some trader willing to take the other side of the transaction without a time delay and in a volume adequate to cover cattle feeders' and portfolio managers' needs. That is what is meant by the term "liquidity."[7]

[7]There are two measures of the level of activity in futures markets. One is *open interest*, the total number of contracts that have been bought and sold and are still in place. The second is *trading volume*, the number of contracts traded in a particular day. When open interest and trading volume are relatively high, the liquidity in the market is then typically adequate for effective trading by large and small traders, both hedgers and speculators. These concepts will be covered in more detail in later chapters.

Experience has shown that a necessary condition for liquidity is active involvement by speculators. The speculators enter the futures markets looking for profits. They want to buy low and sell high, or sell high and buy back low. Risk capital is needed to cover margin requirements and to absorb losses when the speculative trade turns out to be a losing trade.

There is, at any point in time, a limited supply of speculative capital. Speculators have many investment alternatives from which to choose, and futures trade is just one of those alternatives. Within trade in futures contracts, there are many different commodities and products available. The speculator interested primarily in agricultural commodities can trade live cattle, beef trimmings, feeder cattle, hogs, pork belly, and milk futures on the Chicago Mercantile Exchange (CME), or soybeans, soybean meal, soybean oil, corn, oats, and wheat futures on the CBOT. Other classes of wheat are traded on the Kansas City and Minneapolis exchanges, and a New York Exchange offers futures trade in cotton and selected dairy products. Orange juice and petroleum products such as crude oil are traded via associations established at the New York Exchange. Coffee, sugar, and cocoa are also traded in New York. If the speculator feels comfortable with the nonagricultural commodities, there are numerous futures contracts in interest rate futures, stock indices, and foreign exchange futures. Add the widely traded precious metal futures—gold, silver, copper, platinum—and it is clear that a great deal of competition exists for the speculative investment dollar within the futures complex.

If trade were conducted in each month for the many futures contracts traded, the markets could be "thin" and liquidity would suffer. When there is only limited trade in a futures contract for a particular month, the filling of orders will be difficult. In other words, there may not be enough liquidity to meet the needs of hedgers interested in eliminating exposure to price risk.

The exchanges therefore tend to go to an alternate month format or select months that best fit the needs of those involved in the cash markets. In feeder cattle, for example, trade in feeder cattle futures is for steers weighing 600–800 pounds that are ready to move into feedlots. Production programs tend to be of two types. Calves carried through the winter months are generally sold as feeder cattle in the spring months, and calves carried through the spring and summer grazing season are typically sold as feeder cattle in the fall months. There is, therefore, a strong seasonal pattern to the production and pricing of feeder cattle, and the months for which futures are traded have been selected to fit the production patterns.

Trade in feeder cattle futures was started in 1971, and for many years, the Chicago Mercantile Exchange listed futures contracts for March, April, and May and then for August, September, October, and November. As suggested, the months were selected to fit the production patterns in the cash markets. In the early 1980s, receiving strong encouragement from producer groups, the exchange initiated trade in a January futures. Trade in the January contract continues to be small, but has been adequate for the exchange to keep the contract listed. It appears the January feeder cattle futures helped to fill the time gap between November and March and attracted attention of users and traders for that reason.[8]

[8]A January contract for live cattle futures, or slaughter cattle futures, was started at the same time. The contract never attracted interest and was later dropped. Apparently, there was less need for a January contract in live cattle when December and February contracts are traded, and the time span between the existing contracts for fed cattle coming out of feedlots was less than that for feeder cattle.

In the corn market, the strong seasonal pattern emerges again. With harvest in October and November, the December contract is positioned to discover the price for the new crop in any particular year. Typically very high levels of open interest and trading volume occur in the December contract, and the liquidity is there to meet the needs of the small farmer who needs to establish hedges, and the large-volume grain elevator who needs to hedge the cash contracts being extended to producers.

The primary motivation behind the selection of months is therefore tied to the nature of the cash market programs and to the need for market liquidity. A related and less frequently mentioned, or less frequently admitted, motivation is to give the speculator the impression that profit opportunities might exist.

Speculative capital tends to move toward areas and toward futures contracts that offer profit potential. In a production year plagued by drought problems, speculators will flock to the corn and soybean futures in search of major profit opportunities. If futures were traded for each month for corn, the speculators tend to see fewer opportunities. Any chance to arbitrage between the cash and futures markets or between different months of the futures market is diminished when futures are traded for each month, and the CBOT is afraid that the speculators will move their capital to other alternatives.

To illustrate the important concept of arbitrage, consider the situation in which September corn futures are at an unusually high premium relative to December futures. Speculators who have data showing the historical relationships may see the chance to profit by selling September futures and buying December futures. This arbitrage activity will tend to help restore a near-normal relationship between September and December and the speculators' trades add liquidity to the market. If there were corn futures for October and November as well (there are none), speculators might see less opportunity for profitable arbitrage activity and take their risk capital to some other opportunity.

Users who do not understand the importance of speculative activity will continue to ask for more futures contracts. Hedgers often want a contract for each month so they can "match" their cash program more closely in futures trades. The exchanges will tend to resist in an effort to protect liquidity and ensure the viability of their contracts. A compromise will always be necessary, but that compromise will seldom if ever involve moving to trade of futures contracts for each month. Of the commodities or products listed in Appendix 1B, crude oil traded on the New York Mercantile Exchange is an exception. With worldwide interest in petroleum as a primary source of energy, there is apparently enough hedging and speculative interest to support trade in each calendar month. You will find the same thing is happening in some interest rate futures where the volume traded is often huge and lack of liquidity is not a concern.

Futures contracts are not traded for each month of the year. The months selected for trade represent efforts by the exchanges to offer trade in those months necessary for those involved in the related cash markets while ensuring liquidity in those months for which trade is conducted. The concerns for liquidity reflect the importance of speculative activity in the markets and you should start to build a perception (correct) that trade in commodity futures would be impossible without the presence and activity of the speculators.

COMMODITY FUTURES: WHY

Trade in commodity futures contracts exists for two related reasons. First, the trading of contracts for futures delivery contributes to the process of price discovery. Second, trade in commodity futures contracts provides a mechanism which can be used to reduce or eliminate the risk of fluctuating cash prices faced by those dealing in the physical commodity. This process of transferring cash-price risk is called *hedging*.

Commodity Futures and Price Discovery

In any market in which prices are not set by the sellers on a cost-plus or administered-price basis, buyers and sellers come together or communicate and negotiate prices and related terms of trade. *The process of gathering and interpreting information on supply and demand, formulating an asking (or bid) price, the give and take during the negotiations, and the dynamic adjustments to new information as it becomes available across time is called price discovery.* It is, as implied, an ongoing and continuous process.

The futures markets provide centralized and highly visible trade within which information can be received, interpreted, and incorporated into a discovered price. By definition, the futures market is an anticipatory or forward-pricing market. It is attempting to "discover" what the price of a commodity will be at some time in the future. *The price of a commodity futures contract on a particular day can be meaningfully interpreted as the consensus of those trading on that day as to what the price will be at the future point in time.* That consensus is based on the available information and the consensus will change over time as expectations for supply and demand levels for the future time period change. It is very important that you develop an understanding of this price discovery function of futures markets and why it is so important.

In a storable commodity such as corn, the cash price is directly related to the futures market. The bid price posted at a local elevator is the price of the appropriate futures contract minus an adjustment for location since the corn futures are traded in Chicago at the CBOT. Figure 1.2 provides a plot of the closing price for a recent March corn futures contract and the cash price (Central Illinois) from October 1 until the March futures contract "matures" and trade ceases during the third week of March. The two price series tend to move together in parallel fashion. *It is primarily in the futures market that the price is being discovered, and it is the futures market that is recording and interpreting changes in the available body of information that will influence prices for later time periods.*

You should pause and reflect for a moment. The cash prices shown in Figure 1.2 are prices offered by grain elevators in central Illinois. The futures price is the price *for the March futures* on the same days for which cash prices were recorded *starting with October 1*. It is the daily discovered price for March futures that is the key indicator of price, and the cash price is tied to the futures price. Elevators base their cash bids on the closest futures contract. Chapter 2 will deal in detail with the difference between the cash and futures markets (it is called "basis") and why it might change over time. It is sufficient here to recognize that the task of discovering price for corn, wheat, soybeans, cotton, and other storable commodities is awarded primarily to the futures markets. The cash price is tied directly to the futures price.

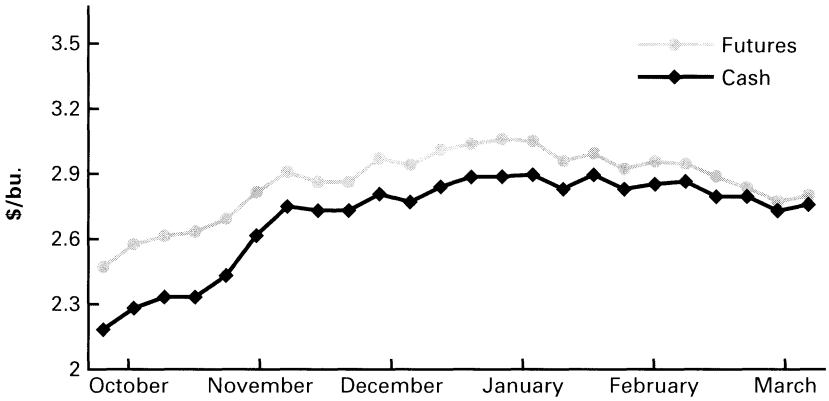

FIGURE 1.2
Cash Corn and March Corn Futures Prices, October to March, Recent Year

The relationship between futures and cash prices is less stable and less apparent in a commodity such as slaughter cattle. In the grains, the difference between December and March corn will typically approximate the cost of storing corn from December to March. For slaughter cattle, there is no storage function. The cash and futures markets are more nearly separable, with each functioning in the presence of the other. Unlike the crops in which supply is fixed once harvest is completed, the supply of cattle can change throughout the year. The futures market has to register this possibility of intrayear supply changes. This becomes apparent if we consider the impact of a drought that forces cattle off pasture and increases slaughter levels, depressing current cash prices. But the unexpected and forced increase in slaughter will influence the supply of cattle in later time periods. Prices for distant futures contracts might move higher, reflecting expectations for decreased cattle slaughter in the later time periods.

The plot in Figure 1.3 relates futures quotes for December live or fed cattle futures to cash prices in Western Kansas from early August until early November. Early in the period, the December futures are above cash, and that relationship persists until early November. As new information emerges about the likely prices in December, the December futures move below cash in early November. Eventually, the two series will tend to converge as the maturity date of the December futures approaches.[9]

The price discovery function of the futures markets receives very little attention from the user and casual observer of the markets, but is arguably more important than the much-discussed risk transfer or hedging function. It was suggested earlier that it is important that you build an appreciation for the importance of this role of the futures markets. Some simple examples should help early understanding, and we will come back to this issue in later chapters.

During the January–April period, many midwestern producers have to make a decision on how many acres to plant in corn and soybeans respectively. *In making*

[9]All futures contracts have a specified "maturity date." The December live cattle futures will mature on December 20 or the business day immediately preceding the 20th day of the contract month. The exchanges can provide detailed information on their futures contracts, which includes maturity or expiration times for the various contracts. This type of information is also available from commodity brokers and in calendar format on electronic systems.

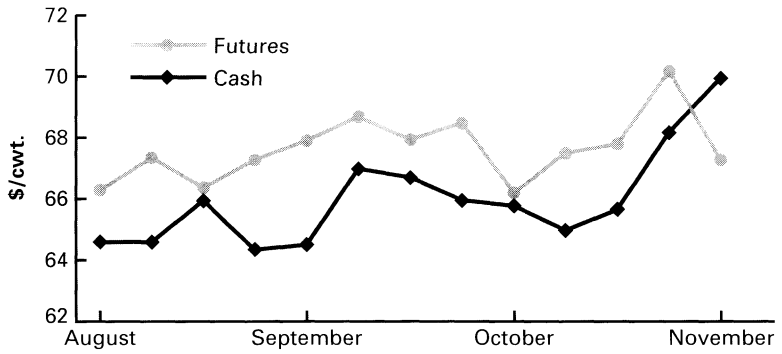

FIGURE 1.3
Cash-Futures Relationships: Western Kansas Cash and December Cattle Futures Prices

that decision, some type of price expectation has to be used. Surveys indicate that producers increasingly watch futures prices and use distant futures prices as a source of price expectations. Keep in mind that what is needed is an expectation for price in the harvest period, which is up to 10 months later. The futures markets are not always accurate predictors of later cash prices, but they are one source of price expectations that are highly visible and available to everyone.

To illustrate, assume it is March 1 and a particular producer is wrestling with the decision on how many acres to plant in corn and in soybeans. Historically, it has taken soybean prices about 2.4 times corn prices to generate equal levels of profitability on a per-acre basis. On March 1, November soybean futures are trading near $7.50 per bushel and December corn futures are trading near $2.50.[10] That gives a price ratio of 3:1, and soybeans look more favorable than corn. The producer reacts to the opportunity and decides to plant more acres in soybeans and decrease acreage in corn compared to recent years.

Many thousands of producers are watching the same set of price expectations and considering making a similar change.[11] As the realization that a widespread switch to soybeans is occurring spreads through the markets, traders of corn and soybean futures start to recognize they have underestimated producers' willingness and ability to switch from corn to soybeans. The price for November soybean futures starts to move down from $7.50, and the discovered price for December corn futures moves above $2.50. At planting time during May, November soybeans are trading at $6.60 and the December corn futures are up to $2.75. The information base has changed and the discovered prices must adjust accordingly. If producers continued to switch from corn to soybeans during the planting period, the November soybean prices could be

[10]As will become apparent in later chapters, it is the November soybean futures and the December corn futures that the producer would use to hedge or forward-price soybeans and corn, respectively. Here, it is sufficient to recognize that the trading levels of those distant futures contracts on April 1 can influence planting decisions and to start building recognition that those planting decisions will influence the prices eventually "discovered" for soybeans and corn later in the year.

[11]During the 1980s and early 1990s, meeting the planting requirements to qualify for farm program subsidies limited this type of response. The early 1996 farm bill legislation allows flexibility in planting decisions, and this type of supply response involving switching of crops will be very important in future years.

driven down to a level that profits are small or negative compared to profits from corn on a per-acre basis.

There is no suggestion here that the price expectations offered in the futures markets cause an undesirable type of supply response and related price volatility. *The futures markets must react to changes in prospective supplies, and individual decision makers must be aware that the markets will react.* This is a basic rule that every user of the futures market must recognize and understand.

In the cattle markets, placements of cattle on feed vary with the price expectations being registered in the distant futures contracts. Those reactions appear to stabilize the flow of cattle coming from the feedlots. If the projected supplies of cattle in a later period are small, traders of the futures contracts for the later period discover a higher price, and feedlot operators respond to a possible profit opportunity by placing more cattle. If projected supplies for the distant period appear to be getting too large, the futures contracts for the distant period reflect that in the form of lower prices, and feedlot operators reduce placements. Over time, the futures markets thus have the capacity to stabilize supplies of fed cattle and stabilize fed cattle prices. If producers overreact, however, and do not recognize the aggregate influence of similar decisions by many producers at the same time, the price levels for future time periods can be significantly influenced.

In the storable commodities, the intermonth price patterns can also influence producers' decisions. In winter wheat, to illustrate, the harvest is in June and early July. The premium shown by March futures over the July harvest-period futures is widely seen as a market-determined price for storage. If the premium is large, producers are encouraged to store wheat. Storage affects the supply that is available to the market both at harvest and later in the crop year as March approaches. The price expectations being registered in the markets have the potential to influence the decisions of those involved in producing and/or storing the commodity.

It is clear that the price expectations being reflected by distant futures can and do influence the final supply of product for the later time period. Those distant price expectations have the potential to change producers' decisions. Futures prices must then adjust to the realization that supplies are being changed. This is all a very logical and legitimate part of the price discovery process. To be an accurate predictor of prices in the future time period, the futures market must correctly anticipate the direction and magnitude of the response of decision makers, and that is a very difficult assignment. *It is important, therefore, that you realize that decision makers who respond to the very visible futures markets as a source of price expectations should follow through and get the prices established.* In other words, the decision maker should proceed to use the futures market, or use cash contracts, to establish price and eliminate exposure to price risk. This need sets the stage for discussion of the second and usually most visible function of trade in futures, the hedging or risk-transfer function.

Trade in commodity futures, in registering the influence of changes in information on supply and demand, provides information that has the potential to influence prices in the cash market. Decision makers must be aware of the possibility of a supply response to changed price expectations and seek protection against the risk of falling prices. It is especially important that the individual decision maker keep in mind that many other producers might be considering the same changes or

adjustments and try to anticipate the price implications of those adjustments. You have to be aware of a micro–macro trap here. Individual (micro) decisions will not change prices, but add them all together (macro) and a major price change might be coming. You should start to build an understanding of how important it is for you to protect yourself against the price changes in the micro–macro trap. We will come back to this issue often.

The Hedging Mechanism

The futures market provides an opportunity for the decision maker to escape much *or* all of the risk of fluctuating cash prices. Hedging, as a means of avoiding exposure to the risk of fluctuating prices, can be effective if two basic requirements about the way cash and futures prices behave are met:

1. Over time, cash and futures prices will respond to the underlying forces of supply and demand in such a way that prices in the two markets tend to move together, and
2. As the maturity date of the futures contract approaches, the cash and futures markets will tend to converge and approach some predictable difference called a basis.

To illustrate why these two requirements are important and to illustrate the concept of basis, it is useful to examine the hedging framework in its simplest form.

Date	Cash Market	Futures Market
October 1	An elevator manager is holding significant inventories of soybeans. He is concerned that a large crop being planted in Brazil will push soybean prices lower and cause the value of his inventory to decline.	No position yet. The manager checks his market news wire, checks with his broker, and learns soybean futures for the following May are trading around $6.40.

The manager considers the situation. He recognizes that by selling an appropriate number of soybean futures contracts (each contract is for 5,000 bushels, CBOT or 1,000 bushels, Mid-America Exchange, or MidAm), his cash inventory will be protected if (1) there is reason to expect the futures market to move down if the cash market falls, and (2) there is reason to expect the two markets to come together in May.

To reset the scene:

Date	Cash Market	Futures Market
October 1	Calculates "break-even" cost of 80,000 bushels of soybeans bought in the cash market plus storage costs and plus a $.10-per-bushel profit margin at $6.10 per bushel.	Deposits margin money with his broker and sells 16 May futures (5,000-bu. contracts) at $6.40.

Date	Cash Market	Futures Market
Early May	Soybeans are sold at $5.70 per bushel.	Buys 16 May futures at $6.00, eliminating any obligation to deliver soybeans.
Net:	$.40 "loss" per bushel.	Profit on the round turn of $.40 per bushel.
	Overall: $.10-per-bushel profit to storage before hedging costs.	

This illustration implies the difference between cash and May futures (the basis) is –$.30 on October 1 and is still –$.30 in early May. Technically, the basis is always defined as cash minus futures. It is easy to see why almost all elevators have a policy calling for hedges on inventory. It will be noted later that there is some risk associated with behavior of the basis, but the key point here deals with the underlying mechanism. *With a stable basis, the $.10 profit to the storage program that is reflected in the $6.10 needed break-even price is realized exactly.* Without the hedge, the program would have incurred an operating loss of $.30 and would not have captured the $.10-per-bushel profit—a result of $.40 per bushel below the hedge result. This is obviously important. Start to think about what would have happened if, when the cash market declined, the May futures stayed the same or increased. There would have been no protection. You should stop and think about the obvious—the hedge will not work if cash and futures do not move together.

A hedge will serve its function of offsetting the risk of fluctuating cash prices if and only if the cash and futures markets move together over time and the cash-futures basis approaches an expected level at the end of the decision period.

This statement is true whether we are looking at cattle, corn, wheat, interest rates, sugar, crude oil, or any other commodity or service for which futures contracts are traded. *The behavior of the cash-futures basis is critical.*

Notice we have ignored the nominal costs of trading the futures (commission costs plus interest on margin money). Be aware also that the hedge would have "protected" the manager if the cash price had increased. The round turn trade in the futures would have lost money in a rising market, offsetting unexpected gains in the cash market. For example, the cash market could have moved up to $6.50, earning a $.40 gain in the cash market. But the May futures would now be up to the $6.80 level (using the –$.30 basis or cash-futures difference again), and would have to be bought back around $6.80. The round turn in futures (selling at $6.40, buying back at $6.80) would lose $.40. The profit to the storage program would still be the $.10-per-bushel margin that was established by the hedge. These points will be illustrated many times later in the book. The purpose here is to illustrate the importance of the two markets moving together and converging. *Before proceeding, you should definitely try other price levels to confirm that, before the costs of the hedge are accounted for, the net profit will always be $.10 per bushel, regardless of the absolute price level, as long as the cash-futures basis in early May is –$.30.*

Whether cash and futures markets move together is a hypothesis that can be tested empirically. Empirical examination shows that (1) the two markets do tend to

move together over time, and (2) any risk associated with a variable and unpredictable basis is significantly smaller than the risks associated with unhedged fluctuating cash prices. The risk of unexpected basis behavior will be covered later, but it is *not* large and *it is much smaller for virtually every commodity than is the risk of cash-price fluctuations.*

The assumption regarding behavior of the cash and futures markets can also be supported on the basis of logical reasoning. Both markets are operating within the same economy, are being barraged daily with information from the same economic developments, and are trading the same commodity. The only difference is in time. Cash prices are for today's market; futures prices are for some period in the future. As the maturity date of the futures contract approaches, the two markets are discovering the price for the same commodity *in the same time period*, and the prices would be expected to converge on some predictable basis level. After all, the underlying supply–demand forces are now representing the same time period and represents essentially the same set of information in both the cash and futures markets. Any difference, as the maturity date of the futures contracts approaches, should be a reflection of location. The futures contracts are traded in Chicago, New York, Kansas City, or in some other city, and the specific cash market may be at some distance from those cities.

The hypothesis regarding convergence of the cash and futures markets can thus be confirmed by both empirical observation and logical reasoning. Logic further suggests that the opportunity for arbitrage will ensure that the futures contract will not close or mature above cash prices by more than the costs of delivering the commodity under the provisions of the futures contract. During the maturity month of the futures contract, there is a designated period within which delivery can be completed. If the futures price is above cash by more than delivery costs, any experienced trader can

1. Buy the relatively low-priced cash product;
2. Sell futures contracts and notify the exchange of intent to deliver; and
3. Deliver the product under the provisions of the futures contract at a profit.

Delivery procedures vary across commodities, ranging from shipment of a bulky product such as fed cattle to designated delivery points to the transfer of a certificate identifying grain in an approved warehouse. When futures prices are too high, the arbitrage buying boosts the cash market and the selling forces down the futures. *These actions tend to force futures to converge to a level of cash price plus delivery costs. All that is needed, remember, for the hedge to be effective is that the cash futures basis at the end of the production period approach an expected level. Arbitrage between cash and futures markets by experienced traders will make this happen for you.*

To illustrate further, consider the live cattle futures and assume the position of an experienced trader in fed cattle located on the terminal market at Omaha, one of the designated delivery points. On a day in early June, when delivery under the June live cattle futures is now being allowed, the trader observes

1. Cash cattle of deliverable quality selling at $70.00 per hundredweight;
2. June futures trading at $73.00 per hundredweight; and
3. Available estimates of the costs of delivery under the specifications of the live cattle futures at $1.50 per hundredweight.

The cost estimate is based on past experience, and represents USDA grader time, paperwork costs, pen rental, and any other incidentals associated with live cattle delivery. The trader can buy the cash cattle, sell the June futures, and meet the obligation for the short position in June live cattle futures by delivering the cattle versus buying back the futures. If the cattle can indeed be bought at $70.00 and the futures can be sold at $73.00, the trader can net $1.50 per hundredweight ($3.00 gross margin less the $1.50 delivery costs). Traders' arbitrage actions tend to boost cash prices as they buy cash cattle, push futures down as they sell futures, and move the cash futures basis toward the expected –$1.50 per hundredweight, a basis level that reflects the $1.50-per-hundredweight delivery costs. If many traders (or cattle feeders or other producers) deliver in the futures market, the expected convergence on a basis of –$1.50 per hundredweight is essentially guaranteed by that delivery process, and users can count on the hedge to work.[12]

If futures prices are low relative to cash, another set of actions evolves to force convergence. Holders of long positions in futures contracts can, by declining to sell the futures and complete the round turn, accept delivery of the physical product. This removes buying power from the cash market, as packers, for example, accept delivery of cattle versus buying cash cattle, and forces hedgers and speculators holding short positions in futures to bid up futures trying to complete their round turn. Convergence is again assured.

For some commodities and futures instruments such as feeder cattle, a new lean hog futures starting with the February 1997 contract, and interest rate futures, there is no physical delivery process and a *cash settlement* approach is employed. Any remaining contracts on the maturity date of the futures are "settled" using a widely published cash price or cash-price index. The sometimes difficult physical delivery of the commodity or instrument is avoided, but the economic forces forcing convergence are the same. A producer holding short hedges in feeder cattle, for example, will tend to hold the short positions if the futures are above cash. Holding rather than buying back tends to move the futures down toward the cash-price series (called the National Feeder Steer Price Series), and convergence is assumed. Conversely, if the cash series is above the futures, holders of short positions will hurry to buy them back since being "cash settled" at a higher price would mean losses to the short futures position. The buying action boosts the feeder cattle futures and prompts cash-futures convergence.

There is interest in moving to cash settlement for any commodity or instrument in which (1) the use of a futures contract would be difficult with actual delivery (such as futures for a stock index) and (2) a representative and broad cash-price index can be developed (such as the feeder cattle, with weighted average prices across 12 midwestern states). There are clear advantages to elimination of the physical delivery

[12]The idea is that the *threat of delivery* will ensure that the cash futures basis will approximate the $1.50 differential. The futures market is not intended to be an alternative market that actually handles the cattle. The possibility of delivery is included with the hope that the basis will always converge to an expected level, make the hedges effective, and no deliveries will be required. It is the possibility of delivery that *guarantees* the basis will approach some expected level and keeps the risk associated with basis variability to acceptable levels. Starting with the June 1995 live cattle futures, the buyer of futures who does not offset that position and chooses to accept delivery can request that the delivery be made in certified packing plants in carcass form. This change was intended to improve the delivery process, but the idea of arbitrage is still there and is still relevant.

process, but the need for a cash-price series or index that is broadly based and free from possible manipulation has stopped the move to cash settlement for some commodities such as fed cattle (the live cattle futures).

Figures 1.4 and 1.5 record the paths of cash and futures prices for hogs and for soybeans, respectively, picture the convergence discussed here, and suggest that the process works for all commodities. The forces that cause convergence between cash and futures for hogs and soybeans are the same as those demonstrated for cattle where delivery is still involved. The two figures offer interesting patterns of price movement.

In both cases, the futures are slightly above the cash prices when the futures contract is closed and trading stops. *You should not be concerned about this apparent lack of convergence.* Remember, the cash-price series used in the plots are not for Chicago, and the cash-futures basis must reflect a location adjustment. It must also reflect a cost of delivery as illustrated earlier for cattle. *It does not matter whether the convergence is to a basis of zero or to some nonzero level. As long as convergence to a predictable level is consistent and reliable, the hedge will work.*

Figures 1.4 and 1.5 also demonstrate again the difference in basis patterns for storable versus nonstorable commodities. The basis for the soybeans in Figure 1.5 is fairly stable, especially in November and December. The basis for hogs in Figure 1.4 is not. The early futures prices for hogs in Figure 1.4 suggest that the cash prices of $50–55 per hundredweight will fall into the $40s by December, and cash prices did move lower as December approached. Again, the implication of the different time period in the cash and futures prices for a nonstorable commodity is apparent. The supply of hogs was expected to be higher in December, pushing prices lower, and the December futures contract was registering this expectation earlier in the year.

Later chapters will offer many examples of the hedge process and the mechanics of incorporating a basis allowance. *The need here is for you to understand that there are logical economic forces in the marketplace that ensure that the cash and futures difference will converge on some expected basis level.* The ideal situation, to repeat and for emphasis, would be one in which there are no deliveries under the futures contract because the threat of delivery ensures cash-futures convergence to predictable levels.

Trade in commodity futures provides a hedging mechanism that can be used to eliminate or reduce the risk of cash-price fluctuations. The effectiveness of the hedge will vary with the extent to which the cash

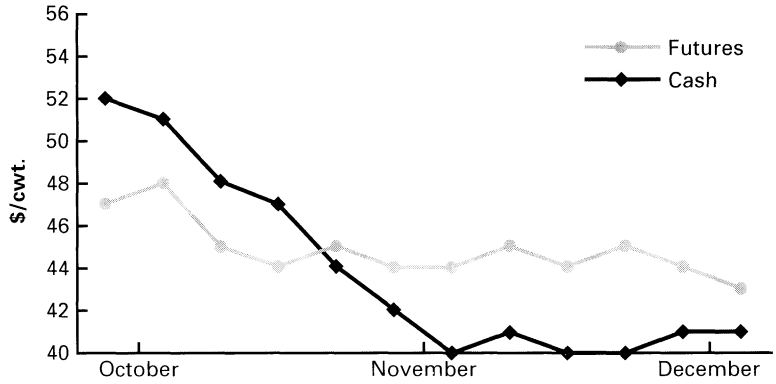

FIGURE 1.4
Convergence of Cash and Futures Prices for Hogs: Omaha Cash and December Futures Prices

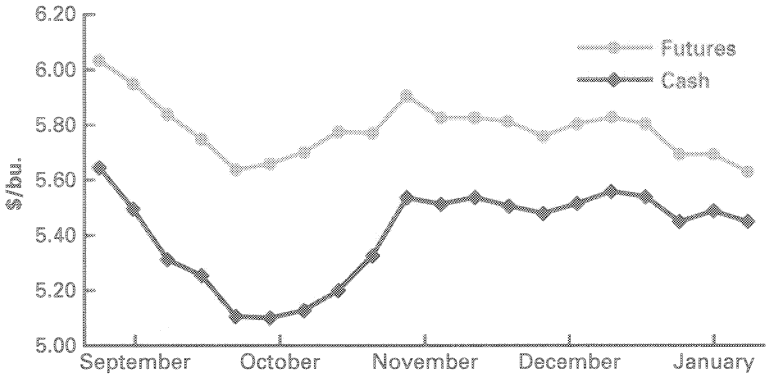

FIGURE 1.5
Convergence of Cash and Futures Prices for Soybeans: Illinois Cash and January Futures Price

and futures move together and converge during the maturity month of the futures contract. In other words, hedging will be effective if the behavior of the cash futures basis is either stable or the basis moves to an expected or predictable level. There are forces in the marketplace to ensure that the necessary convergence to an expected basis level will occur to a workable degree of reliability, and this convergence makes hedging work.

COMMODITY FUTURES: HOW

Trade in commodity futures involves two general categories of traders identified earlier, speculators and hedgers. The objectives of the two types of traders are different. Speculators are looking for profits; hedgers are looking for protection against cash-price risk. The two groups may differ in the analytical techniques they employ, and they often differ in the frequency of trades.

Hedgers' Strategies

Consistent with an overall objective of reducing exposure to price risk, hedgers use a variety of approaches to trade in futures. A simple approach is to use the futures market as a means of *hedging or forward-pricing* when costs are more than covered and a profit margin is being offered.

Selling or going short a commodity futures contract is hedging or forward-pricing the underlying commodity, and the hedger is protected against the risk of falling cash prices.[13] The producer or holder of a product must decide, at any point in time, whether the forward-pricing opportunity being offered is acceptable. The expected *forward price* can be calculated as follows:

[13]Users of the commodities are concerned about rising cash prices because their costs would go up. These hedgers are called *long hedgers*. In this initial chapter, the illustrations will stick with the more widely seen *short hedge* for agricultural producers. The long hedge will be explained and explored in later chapters.

Forward Price = Futures Price + Basis

The basis, in this instance, is an adjustment to localize the futures price. It is the expected difference between the futures price and the cash price in the producer's local market where the cash product will be sold. Keep in mind that cash prices in most production areas are below futures prices, so the basis is usually negative. Thus, the forward price on any day is the current futures price for the later period minus the absolute size of the expected closing basis, the basis at the end of the production period. In developing the basic concepts, the costs of the futures trades are ignored for simplicity. The costs, in the form of commissions and interest on margin funds, do not change these basic illustrations, and we will introduce them later in the book.

By comparing the forward price to budgeted production costs, the producer of the product can decide whether the forward price is acceptable. If the answer is yes, futures contracts are sold and held until the end of the period when the product is sold in the cash market and the futures contracts are bought back to complete the round turn in the futures market. This "buying back" eliminates any futures market commitment to deliver the product.

Using the futures market as a forward-pricing mechanism and hedging when the price level is considered acceptable is a simple approach. Deciding what price should be accepted and when to price is the most difficult part of this strategy. The practice of selling a futures contract and then holding that futures position until the cash commodity is sold is called a *conservative* hedging strategy in the trade.

As hedgers gain more experience in trading, they often seek to become effective *selective* hedgers as contrasted to the conservative hedger. The producer seeks to "select" when to have the hedge in place and when it should be removed and put the producer back in the position of being a cash market speculator. The analytical tools needed to provide a base for effective selective hedging strategies will be developed in detail in later chapters. Here, we just need to demonstrate the basic procedures.

Table 1.2 illustrates a simple conservative hedge for corn assuming the producer decides to hedge in June after the crop is up and growing. You should go over this

TABLE 1.2
Demonstration of a Short Hedge for a Corn Grower

Date	Cash Market	Futures Market
June 3	Estimate production cost @ $2.10. Estimate October basis @ –$.30.	December @ $2.80.
	Forward price = $2.80 – .30 = $2.50 Profit margin = $2.50 – 2.10 – $.40	
June 3		Sell December @ $2.80.
October 10	Cash price = $2.40 Net = $.30	Buy back December @ $2.70. Net = $.10
	Realized price = $2.50 Overall profit = $.40*	

Costs = 1 to 1.5 cents per bushel in commission costs plus interest on margin funds for 4 to 5 months.

*The overall net is exactly equal the projected profit because the final basis is the projected –$.30. With the cash market at $2.40, the December corn futures are $2.70, which results in a final basis of –$.30. The realized "forward price" can always be calculated by adding the cash price and the net from the round turn in futures, or $2.40 + .10 = $2.50.

illustration carefully, making sure you understand each number. The $2.10 cost comes from budgeted costs of production. The estimated October basis of –$.30 must come from historical records of cash prices *in October* compared to December corn futures *in October. It is very important to get these details down before proceeding.*

The forward price is a direct result of the –$.30 basis adjustment, and the expected profit margin is then a direct result of the forward price and estimated production costs. On October 10, the cash product is sold in the regular cash market at $2.40—the highest local bid the producer can find. The December futures are bought back at $2.70, exactly $.30 above the cash selling price. The realized price is the expected $2.50 which generates a $.40 per bushel profit.

Table 1.3 repeats the illustration in Table 1.2, but illustrates what happens when the final or closing basis is –$.35, not the expected –$.30 per bushel. The results illustrate what is meant by *basis risk*. The weaker (more negative) basis than was expected reduces the net returns from the hedge by $.05 per bushel. *You should spend whatever time is necessary on Table 1.3 to ensure complete understanding of what is being done and why the results are as shown, and what would happen if the ending basis is still at other levels.* Confirm, for example, that the "overall" will be $.45 if the cash price in October is $2.70 and December futures are bought back at $2.95. Table 1.3 moves beyond the simplistic use of a constant basis in earlier discussion *and this extension is very important. It demonstrates better what the real world often shows.*

Table 1.4 demonstrates a hedge on cattle and assumes the hedge is established by selling October futures in June when the feeder cattle are bought and placed in the feeding pens. The cattle are projected to finish in mid-September. In this example, the cash price moves sharply lower and the hedge protects the producer against major losses. The hedge nets $5.50 per hundredweight before commissions because the closing basis is –$1.50, not the –$2.00 that was incorporated on July 10. If the October futures had been near $61 on September 15 and had to be bought back at that level, the overall would have been the expected $5.00 per hundredweight.

Careful examination of the examples reminds us that whenever the cash futures difference or basis at the end of the program equals the expected basis incorporated

TABLE 1.3
Demonstration of a Short Hedge for a Corn Grower When Final Basis Does Not Equal Projected Basis

Date	Cash Market	Futures Market
June 3	Estimate production cost @ $2.10. Estimate October basis @ –$.30.	December @ $2.80.
	Forward price = $2.80 – .30 = $2.50 Profit margin = $2.50 – 2.10 – $.40	
June 3		Sell December @ $2.80.
October 10	Cash price = $2.40 Net = $.30	Buy back December @ $2.75. Net = $.05
	Realized price = $2.45 Overall profit = $.35*	

Costs = 1 to 1.5 cents per bushel in commission costs plus interest on margin funds for 4 to 5 months.

*The overall net is not equal the projected profit because the final basis is –$.35 rather than the projected –$.30. With the cash market at $2.40, the December corn futures are $2.75, which results in a final basis of –$.35. The realized forward price is $2.40 + .05 = $2.45, not the expected $2.50.

Date	Cash Market	Futures Market
July 10	Estimate cost @ $65.00 per cwt. Estimate Sept. basis @ –$2.00 per cwt. Forward price = $72 – 2.00 = $70.00 Profit margin = $70 – 65 = $5.00	October live cattle @ $72.00
July 10		Sell October @ $72
September 15	Cash price = $59 Net = –$6.00	Buy back October @ $60.50 Net = $11.50
	Overall = $5.50*	

TABLE 1.4
Demonstration of a Short Hedge for a Cattle Feeder

*The overall net is $5.50 per cwt. because the final basis is –$1.50, not the expected or projected –$2.00 basis at the time the hedge was placed. Note that basis risk can help or hurt the final margin.

in the hedge decision, the net before commissions is exactly the expected profit margin regardless of whether prices go up or down. It follows, therefore, *that the hedger is still exposed to the risk that the final basis will not be the expected basis.* Emergence of basis risk, where the final basis is not equal to the expected basis, results in a realized price and a realized profit that will not exactly equal the expected levels. *The realized forward price is the cash price plus the net from the futures trade, and it will equal the forward price only if the closing basis is at the expected level.*

To make sure this is clear, you should go back and work though the results in Table 1.2 if the cash price is $2.40 when the cash corn is sold and the futures have to be bought back at $2.60. The overall or realized profit margin is $.50 and the realized forward price is $2.60. *Make sure you can reproduce results of this type before proceeding.* Fill in the blanks for realized profit and forward price when the October 10 results are:

Cash	December Futures	Overall Profit	Forward Price
$2.10	$2.50	_____	_____
2.50	2.75	_____	_____
3.10	3.32	_____	_____
3.30	3.70	_____	_____

The results indicate that a basis that is stronger than had been expected at the end of the production period is favorable for the producer. Thus, as noted in Table 1.4, basis risk can be "good" or "bad" for you as a hedger. Keep in mind that as an individual producer, you have no control over either the cash price or the futures price. Producers will have to sell at the cash price that is being offered at harvest and buy back the futures at whatever level the futures market is trading.

The hedge that uses the futures directly therefore guarantees the hedger a specific price and a specific profit margin subject to basis risk. Producers, firms holding an inventory, and short hedgers tend to get upset when the price level goes up and the hedge "protects" them from the benefits of higher prices in the cash market. If the cash cattle prices in Table 1.4 were $79 on September 15 instead of $59, to illustrate, the unhedged or cash speculative program would have received a $14 per hundredweight windfall return. The hedged program will receive around $6, depending on the final

basis, and the windfall gain in the cash market will be denied by the hedge. Producers often see the missed opportunity as a loss and may be reluctant to hedge again.[14]

The use of options on futures, a relatively new tool that emerged in the mid-1980s, has the potential to eliminate these *opportunity costs* that come with short hedges in rising markets. The options therefore appear to have the potential to overcome the reluctance of producers to use the markets for fear they will peg prices below those that later develop.

The basic difference when using options is easy to demonstrate. The forward price from the straight hedge using futures was calculated as follows:

Forward Price = Futures + Basis

A *put option* gives the hedger the right, but not the obligation, to a short position in the futures. A floor price is established as follows:

Floor Price = Futures Price + Basis – Premium on Put Option

A particular futures price, called a *strike price*, is selected and adjusted for basis and the premium for that particular strike price. Detail on the use of options will be left until later chapters. Here, you only need to recognize that *there is now available an alternative approach that establishes a price floor for the producer rather than establishing a particular price*. The options thus have the potential to (1) reduce or eliminate the producer's concerns over the opportunity cost of pegging price too low, and (2) eliminate the producer's concerns over financing of margin calls. In using options to establish a price floor, the producer pays the option premium up front *and there is no exposure to margin calls*. The options are an exciting new tool and Chapter 7 is allocated to coverage of the options later in the book.

Both the direct use of the futures as a hedge and options leave the user exposed to basis risk. How big is this risk and how does it compare to the risk in the cash market?

The answer depends on where the producer is located. The corn producer in central Illinois may see very little variation. In Virginia, where corn production is much more susceptible to the vagaries of the weather, the basis can be more volatile. Across the past five years, the corn-producer in the primary corn-producing area in Virginia saw the October basis (cash in October less December futures) average –$.03 per bushel with a range of –$.15 to + $.09. *Obviously, some risk is still associated with*

[14]Actually, what has occurred is what economists call "opportunity costs." The opportunity cost of taking a course of action is what you give up by not taking some other course of action. Here, the opportunity cost of hedging is the $14 per hundredweight gain that would have been received by being a cash market speculator. Producers do tend to think about the situation this way, but you should start to develop the capacity to evaluate the alternatives in terms of risk exposure. In comparing two alternatives, the mean-variance measures of income are widely used in the literature. The importance of the mean or average levels is apparent, but it is the variance—a statistical measure of variability—that becomes critical to many decision makers. Many risk-averse decision makers are willing to take a lower mean level of income over time in order to achieve a less variable income stream. The preferences in terms of mean-variance measures will vary across individual decision makers with their attitude toward risk and their financial ability to carry risk. There will be more emphasis on this in later chapters, but you need to pause and think about your attitude toward risk in the context of these illustrations.

the basis. This topic will be dealt with explicitly in Chapter 2 and will be covered by examples throughout the book. *Basis risk is part of the hedge or option program and you cannot avoid it.*

Hedgers are looking for protection against unpredictable moves in cash programs. The most common need is protection against falling prices by the producer. Protection is gained by selling or going short in the futures and relying on the economic forces that ensure that the cash-futures basis will approach the expected level at the end of the program. The relatively new options allow the producer to establish a price floor and eliminate concerns over margin calls and the concern that prices will go sharply higher after prices are set in the futures. Regardless of the tool or technique, the need is for protection against costly moves in cash prices.

Speculators' Strategies

The strategies adopted by speculators range from being similar to those of the hedger to intraday programs that have little parallel in hedging programs. The trading activity of speculators provides the volume and liquidity necessary for effective hedging programs. *The speculator accepts the price risk the hedger is seeking to transfer.*

Speculative programs range from high-volume intraday trading at one extreme to a trend-following system that calls for a trade every few weeks or few months. Traders operating on the floor of the exchanges or those at outlying points who monitor trade using electronic equipment with real-time (no lag) price quotes are important in "making the market." Hundreds or even thousands of contracts might be traded in a given day with no overnight positions—that is, all positions are canceled or offset before the end of the trading day. These *day traders* or short-term traders are looking for small price moves. They use analytical techniques based on hours or even minutes versus days or weeks and rely on their skill and the knowledgeable placement of buy or sell orders to limit potential losses and to stay on the profitable side of the action.

Speculators in the soybean futures at the Chicago Board of Trade who specialize in intraday trades might buy July soybeans at $7.105 just after trade opens. The reasoning might be as simple as the fact that the $7.105 opening is below the close of $7.14 the previous day, and that the trading range for most days encompasses the previous day's close. The speculator expects to see prices at $7.14 or higher later in the day.

Assume a particular speculator does in fact buy 100,000 bushels of the July soybean futures at $7.105 within a few minutes after the market opens. The lowest price recorded early in the period is $7.10. The speculator can place a *sell-stop order* at $7.09. The sell-stop order will be activated and filled at the first available price if the market touches $7.09 from above. If the market rallies to $7.135, long positions can be offset by selling at a $.03 per-bushel profit. The variable costs of trades will be extremely small for this type of floor trader and the $.03 per-bushel is a $3,000 gross profit on the 100,000 bushels. The same speculator might trade many times during the day, always looking for a potential gain that exceeds the risk exposure.

At the other extreme, speculators who are trend followers pay little or no attention to the intraday gyrations of the market. They trade more like selective hedgers. They seek to follow the age-old adage that directs one to "ride your winners and cut your losers." The objective of the program is to use fundamental and/or technical

analysis[15] to isolate the long-term trend in the market and trade with the trend. Stop orders are typically used to protect the traders' equity if their analysis proves wrong and/or to lift the position when the price trend changes relative to expectations. Use of the stop orders is covered in detail in Chapter 4.

Speculators in commodity futures are thus investors looking for profits. With margin requirements set at around 5 percent of the face value of a contract, the financial leverage and the potential to make money with a minimal investment are apparent. But the hoped-for results are not always there. Surveys indicate 75–80 percent of the speculative accounts lose money. This is especially true of the many small accounts being handled by investors with little knowledge of analytical techniques and less awareness of the need for trading discipline.

Trade in the highly visible futures (cattle, hogs, corn, soybeans, wheat, interest rate futures, stock indices, foreign currencies, gold, silver, etc.) is successful because speculative activity is present. When the speculators are not present, the contract may disappear.

During the 1970s, for example, the Chicago Mercantile Exchange attempted to start a contract in broilers. After a few months of limited activity, the contract was eliminated.[16] The Chicago Board of Trade has tried a slaughter cattle contract on several occasions, but the trading volume has never been sufficient. A new exchange was launched in New Orleans to trade rice futures, short-staple cotton futures, and soybeans priced at the New Orleans export point. The exchange did not survive. After the farm bill legislation of early 1996, new dairy futures contracts were introduced in both New York and Chicago. It is not clear whether they will succeed. Not only must the contract have the potential to serve a hedging need in the presence of significant exposure to price risk, it must also attract speculative interest and speculative capital. If the speculator is not present and involved, the market can suffer from the related problems of low trading volume and a lack of liquidity.

Before leaving this brief discussion on the involvement and role of the speculator, an important point about the net gain from trade in futures can be made. It is true that for every dollar made in futures, someone else loses a dollar. Critics are then prone to call it a zero-sum game with no net gains for anyone. But that is not true for an entire economic sector. *The producer or the processor of an agricultural commodity has the chance to transfer the cost of exposure to cash-price risk to speculators who are willing participants and who are typically outside the agricultural sector. There can be, therefore, a net gain to a particular sector of the economy in the form of transferring the costs of exposure to price risk to investors trading as speculators outside that sector.* This is a less widely recognized benefit of trade in futures and extends beyond the obvious potential benefits to the individual hedger.

The key is that the speculator and the hedger need each other. If there is no need for protection against cash price fluctuations, there is no

[15]In simple terms, fundamental analysis deals with the basic supply and demand forces that determine prices. Technical analysis relies on the past history of those prices as a base for anticipating prices in the future. Fundamental analysis is covered in detail in Chapter 3, and technical analysis is covered in Chapters 4 and 5. They are then integrated in later chapters.

[16]Interestingly, a broiler contract was proposed again by the CME in 1990. There was apparently a growing expressed need among integrated producers and users such as fast-food chains for a risk-transfer futures investment. But the contract failed again, at least partly because little or no speculative interest developed.

economic justification for trade in futures and there will be no contract. The speculator, therefore, will have no contract to trade if there is no potential for hedging activity. In reciprocal manner, the hedger needs the speculator. If there is no speculator to accept the risk the hedger wishes to transfer and to provide the much needed liquidity and trading volume, the hedger will be denied access to futures trade as a risk-transfer mechanism and as an aid to price discovery.

FUTURES MARKET REGULATION

Users of the futures markets must have confidence in the exchanges and in the trading process. Keenly aware of the importance of their "image," the exchanges adopt strict self-regulatory rules and requirements. As trade in futures grew in the early 1970s, however, there was a growing perception that the public needed and deserved a regulatory agency to monitor and oversee trade and protect the interests of the trader, small or large, against any type of trade-related abuse.

The *Commodity Futures Trading Commission Act of 1974* created a federal agency, the Commodity Futures Trading Commission (CFTC), that has borne much of the responsibility for overseeing trade in futures contracts for the agricultural commodities. A complete coverage of the CFTC and its organization and activities is not needed in this beginning text, but it is important that you recognize that the futures markets *are* subject to the watchful eye of a federal regulatory agency. The reference by Perry Kaufman at the end of the chapter provides detailed coverage of the CFTC and how it functions.

With the advent of the financial futures and the foreign currency instruments in the 1980s, the scope of exchanges such as the Chicago Mercantile Exchange and the Chicago Board of Trade moved beyond the traditional agricultural commodities. With that expansion also came discussion of what agency should oversee trade in futures. The Security Exchange Commission (SEC), the federal agency that monitors trade in stocks, started to show increased interest in futures trade. Trade in futures for the S&P 500 stock index, for example, created the opportunity to hedge the risk in a stock portfolio. The interrelations between the cash and futures sides of financial instruments were being formalized and there were varying opinions on how the regulatory function should be handled.

The mix of agencies and the charge to each will continue to evolve over time, but that is not the important need here. The need here is to recognize that the futures markets are regulated in an effort to protect the interests of the trading public. These regulations are likely to be even more stringent in the future as trade grows and expands and as the exchanges are increasingly computerized and the surveillance opportunities are enhanced by computerization and advances in technology. This is especially true after an FBI investigation in the late 1980s revealed both violations of rules and questionable practices at some of the major exchanges. Confidence of the user is extremely important in the futures markets and the overseeing and regulatory functions are sure to be enhanced as use of the markets grows and expands.

- **The futures markets are regulated by federal agencies. The exchanges regulate themselves, recognizing the importance of their image to the trading public. In the future, as the use of the markets grows, regulation**

is likely to be more extensive and more stringent. You can be confident that your trade in futures and options is reasonably secure and safe.

SUMMARY

Trade in commodity futures and options on those futures is a complex process. New terms and concepts have been introduced in this chapter, but you should not be concerned if everything is not crystal clear at this point. All that is required before proceeding is an understanding of the basic considerations.

Futures markets exist to assist in the process of price discovery and to provide a mechanism that allows producers, holders, and users of a commodity to transfer price risk. The transfer is accomplished by taking equal and opposite positions in the futures and cash markets. A producer of corn, for example, sells corn futures to gain protection against falling cash corn prices. If the cash futures difference or basis is stable or predictable, the protection will be effective and complete.

Before proceeding, you should review all the figures, tables, and illustrations in this chapter. Make sure you understand the important role that basis plays in determining the success of hedging efforts. Review what *price discovery and price risk transfer* are and review *who trades futures and why*. Focus attention on the important difference between the floor price set by options and the specific price set by hedging. Put yourself in the position of a *speculator and hedger*, respectively, and make sure you understand what each is trying to do and *why each is an integral part of the market*. If there is no mystery left when you complete that review, move on to Chapter 2. You now have established the base upon which an understanding of how to use the markets can be developed.

KEY POINTS

- Buying or selling a futures contract means acceptance of a *legal contractual commitment* to accept delivery of, or deliver, the underlying physical commodity on or by a specific date in the future. In practice, however, very few deliveries are actually made. The obligation is offset by buying back, to illustrate, the same number of contracts that was sold earlier.
- Futures markets contribute to *price discovery* by registering the impact of changing information in a centralized and competitive pricing process. The discovered prices in the futures markets are visible to the public and to all potential users and are *increasingly used as price expectations*.
- *The discovered futures prices for distant time periods have the potential to change future supplies*, and those changes will be registered in the form of price changes as part of the overall price discovery process. The possibility of a *supply response* is especially important in the livestock commodities, even within the year.
- Futures markets provide an opportunity for growers, users, and holders of a physical commodity to *transfer the price risk* associated with their positions to someone else. This process is called *hedging*.
- The success of a hedge depends on behavior of the cash-futures difference or *basis*. To the extent the basis does not move to expected levels, the net result of

the hedge can be changed relative to expectations. This possibility is called *basis risk*.

- *The possibility of delivery and/or arbitrage between cash and futures* for both physical delivery and cash settlement futures instruments *causes the cash and futures markets to converge* and keeps the level of basis risk at acceptable levels—at levels well below the risk of unpredictable moves in most cash markets.
- The relatively new options have the potential to establish *price floors* and *eliminate concerns about margins and fears that an opportunity cost will be incurred from pricing too low* when placing hedges directly in the futures in rising markets.
- Speculators are critical to the success of futures markets. They generate *volume* and *liquidity* and *accept the risk* the hedger wishes to avoid, thus allowing a net gain to a particular sector by transferring the costs of exposure to price risk to someone else.

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APPENDIX 1A. CONTRACTS, CONTRACT SIZES, EXCHANGES

Instrument	Exchange	Contract Size
Com	CBOT	5,000 bu
Corn	MidAm	1,000 bu
Wheat	CBOT	5,000 bu
Wheat	MidAm	1,000 bu
Wheat	KC	5,000 bu
Wheat	MGE	5,000 bu
Soybeans	CBOT	5,000 bu
Soybeans	MidAm	1,000 bu
Live cattle	CME	40,000 lb
Live cattle	MidAm	20,000 lb
Feeder cattle	CME	50,000 lb
Lean hogs	CME	40,000 lb
Live hogs	MidAm	15,000 lb
Pork bellies	CME	40,000 lb
Soybean meal	CBOT	100 tons
Soybean meal	MidAm	50 tons
Cotton	CTN	50,000 lb
T-bills	IMM	$1,000,000
T-bills	MidAm	$500,000
T-bonds	CBOT	$100,000
T-bonds	MidAm	$50,000
Frozen orange juice	CTN	15,000 lb
Crude oil	NYMEX	1,000 bbl
Lumber	CME	80,000 bd ft

Where:

CBOT refers to the Chicago Board of Trade.

CME refers to the Chicago Mercantile Exchange.

CTN refers to the New York Cotton Exchange.

IMM refers to the International Monetary Market (division of CME).

KC refers to the Kansas City Board of Trade (hard winter wheat).

MGE refers to Minneapolis Grain Exchange (spring wheats).

MidAm refers to the Mid-America Commodity Exchange (in Chicago).

NYMEX refers to the New York Mercantile Exchange.

APPENDIX 1B. MONTHS FOR WHICH FUTURES ARE TRADED BY COMMODITY

Month	Corn	Wheat	Soybeans	Feeder Cattle	Live Cattle	Lean Hogs	Pork Bellies	T-Bills	T-Bonds	Cotton	Crude Oil
Jan.			X	X							X
Feb.					X	X	X				X
Mar.	X	X	X	X			X	X	X	X	X
Apr.				X	X	X					X
May	X	X	X	X			X			X	X
June					X	X		X	X		X
July	X	X	X			X	X			X	X
Aug.			X	X	X	X	X				X
Sept.	X	X	X	X				X	X		X
Oct.				X	X	X				X	X
Nov.			X	X							X
Dec.	X	X			X	X		X	X	X	X