

CHAPTER 12

CASH-FUTURES RELATIONSHIPS: CAUSES AND CRITICISMS

The nature of the relationship between cash and futures prices has long been a subject of discussion and even debate. Earlier chapters have touched on the source of some of the issues in discussing the basic concepts of hedging and in price discovery. There is clearly a relationship between price of the cash commodity and trade in contracts that call for future delivery of that some commodity. That relationship is formalized in terms of the cash-futures basis, and we have found that the behavior of that basis is critical to the success of hedging or risk-transfer programs in all commodities. But it is not the basis or the observed basis patterns that are the primary source of the controversy.

The problems arise with the tendency to assume or assign casualty. To the uninitiated, the tendency for the cash and futures markets to move together is enough to argue that the move in futures *caused* the move in cash. Add the tendency for futures to occasionally react more dramatically than cash to a new and unexpected bit of information and to show a more pronounced psychological dimension, and some individuals and trade groups are ready to demand legislation to ban trade in futures. There is a presumption that the cash prices would somehow be higher and/or less variable if there were no trade in futures. An example of the thinking is apparent in an April 1990 report released by the Center for Rural Affairs in Nebraska. The report states, "The futures market is now being used in a way it was not intended to be used—as a price discovery mechanism for the cash market."¹ Reference was to the live cattle futures traded at the CME. *Contributing to price discovery has always been one economic justification for trade in futures contracts*, and there are informed observers who would argue that it is the most important function of trade in futures and options.

Lack of information and misinformation hinders the progressive use of futures markets. The techniques, strategies, and approaches presented in earlier chapters will not be adopted or adapted by the decision maker who is not quite sure how the futures market impacts the cash markets. Use of the futures markets or options will not even be

¹*Competition and the Livestock Market*, Report of a Task Force Commission by the Center for Rural Affairs, Walthill, NE, April 1990, p. vi.

considered if there is a perception that the markets are not needed or are a negative influence. *You should be aware of the fact that there exists continuing controversy, and you are entitled to know something about the issues that prompt continued dialogue about the role and influence of the futures markets.* The controversy was fueled again by the FBI “sting” operation at the Chicago Mercantile Exchange and the Chicago Board of Trade in 1988–1989 that uncovered rules violations and questionable tactics by traders at the exchanges. The criticism will not be quick to go away. During 1997, the issue of lifting a long-standing ban on off-exchange agricultural options is being debated—and is very controversial. The off-exchange option-type investments may or may not be tied to futures and options, but all are often seen as in the same area. If the ban is lifted and abuses do develop, any criticism is sure to spill over to the organized futures exchanges.

In this chapter, the relationship between cash and futures prices is explored, explained, and placed in perspective. The objective is to move you as a student of the markets and as a decision maker to a plane of understanding that will encourage intelligent decisions on whether, when, and how to use the futures markets, which has been described in some detail throughout the book.

SOME COMMON CONCEPTIONS AND MISCONCEPTIONS

Every individual and every trade group associated with a commodity has an opinion about the role of futures and whether that role is positive or negative. To cover all the many points of view would be impossible and is unnecessary. Discussion of the more prevalent points of view should suffice.

Futures Trade Is Not Needed

Why do we need trade in futures? Why is the cash market not sufficient? These questions are commonplace among the critics of trade in commodity futures.

Following are some of the many possible illustrations of the ways trade in futures makes an economic contribution.

A bank commits itself to a significant outlay of loans to agricultural producers over the next six months to a year at or near a particular interest rate. To protect against the possibility of interest rates rising and creating a situation in which outstanding loans are earning less than it costs the bank to borrow its own funds, the bank hedges its position by taking an appropriate position in financial futures such as T-bill, T-bond, or Eurodollar futures. *If the possibility of hedging did not exist, the bank would be exposed to the risk of rising interest rates, and the interest rate charged the borrower would surely increase.*

In Iowa, a hog farmer places feeder pigs on a feeding floor. The farmer has budgeted the feeding operation and, with corn at \$2.75 per bushel, estimates a profit of \$10 per head. Selling prices for the hogs have been set via a contract with the local packer. If corn prices increase significantly during the feeding period, the \$10-per-head projected profit can be wiped out. *Without the opportunity for protection on the corn prices via a long hedge using the futures or by buying call options, the farmer might experience difficulty in financing the operation or be hesitant to accept the risk.*

Throughout the grain-producing regions of the U.S., commercial elevators buy grain from producers and place it in storage. When grain is not sold to processors or exporters immediately, the elevator manager is faced with an inventory risk of staggering proportions. Consider, for example, a facility holding several million bushels of wheat bought at \$4 per bushel. The manager hedges that risk by selling wheat futures or buying put options. *If there were no protection against the inventory risk, the elevator operation would be forced to protect itself by reducing its bids to producers to cover the cost of risk exposure over time or to find some other way to protect the value of the inventory. Virtually 100 percent of wheat, corn, soybeans, cotton, and other storable products held in inventory are hedged.*

Multinational grain firms and banks active in the world market were seriously impacted during the 1970s, 1980s, and 1990s by fluctuating exchange rates. Carefully conceived investment plans were wiped out or threatened by dramatic changes in the value of the U.S. dollar relative to other currencies. In response to an obvious and emerging need, trade in foreign currency futures was introduced. *Without the protection of the currency futures, U.S. firms and financial institutions would be seriously constrained as to the role they can play in a dynamic world market.*

In many years, only 10 to 15 percent of corn, wheat, and soybeans is hedged directly by the producer. The level of cash contracting varies but often surges to 50 percent or more in some years when producers are worried about prices. When cash contracts are used, the elevator does the hedging. *Directly or indirectly, the costs of exposure to price risk in a significant percentage of our storable commodities is passed to the speculator outside of the agricultural sector.*

The 1996 farm bill legislation continued the setting of the support price for milk well below the market price. Dairy farmers face a growing level of price risk. In the complex dairy industry, prices in different producing regions have been based at least partly on cheese prices discovered at the Wisconsin Cheese Exchange. During 1997, facing growing concern about its effectiveness, the Wisconsin Cheese Exchange disbanded. There was an immediate need for some new approach to discovering a “base” price for milk. Both the Coffee and Cocoa Exchange in New York and the Chicago Mercantile Exchange are starting trade in milk futures. It appears the responsibility for establishing price levels for the massive dairy industry in the U.S. is shifting to one or both of these exchanges, and the dairy farmer will now have a way to manage volatile milk prices. *You would agree that trade in milk futures could prove to be very important to the dairy industry and dairy farmers across the U.S.*

It appears the futures markets are needed. The markets are a part of the institutional framework that finances economic activity and stores, handles, and transports the product of that economic activity. In many of these areas, we could argue that if the futures markets did not exist, something—some other type of institution—would have to be developed to allow the transfer of price risk and to perform the functions of the existing futures markets. If there are no mechanisms in place to transfer the costs of exposure to price risk, then prices to producers would be lower and/or prices at the consumer level would be higher over time, and society in general would be the loser.

Futures Prices Cause Breaks in the Cash Market

The issue of causality comes up more directly here and it is an important issue. Investigation of causality between cash and futures markets can be treated along a continuum from the very simple to the very complex. At a simplistic level, the argument typically heard runs something like this:

The futures market caused the break in cash prices. Everything was going fine until the futures prices dropped and that caused the cash prices to fall.

This “conclusion” crops up in the slaughter cattle market, for example, when a dip in live cattle futures precedes or parallels a drop in cash prices. We see the same thing in the cotton market, in the soybean market, and in the many other areas in which parallel futures and cash markets exist. There is the presumption that the futures market is the culprit when the cash market moves to the disadvantage of cash market participants. And the appearance of causality is there. *What’s wrong with concluding, when a drop in futures prices precedes a drop in cash prices, that the change in futures caused the change in cash?*

To get at this question, it is important to remember that both markets are discovering price for the same commodity. Both markets react to information coming out of essentially the same supply–demand setting. The only difference is the time period for which prices are being discovered. Even that difference disappears as the maturity date for the futures contract approaches. In this environment, if one market has the capacity to register the impact of a new piece of information more quickly, then it will react before the other market reacts.

It appears the capacity of the centralized futures market to react quickly to new information is the root of many of the charges of “causality.” Most research suggests that the futures market is an efficient market in that it responds, on any particular day, to all the publicly available information on that day. The key question is: Is it logical to assign causality to the futures market because it registers first the impact of a change in the information on supply and/or demand? Is it not logical to assume the cash market would have reacted in the absence of a futures market once the new information filtered into the much more decentralized cash market? And is it not possible that the cash market may in fact react more quickly to certain types of information?

The participants in the two markets *are* different. Much of the direction in the futures market comes from the buying and selling actions of skilled analysts in the large firms who are also active in the cash market. Other impact comes from buy or sell recommendations of large brokerage firms who employ analysts to appraise both the fundamental and the technical aspects of the market. It *is* true that some of the trading in the futures markets is by the often poorly informed speculator, but this is not the major “market moving” part of the total trade. Some of these participants are small speculators, but small hedgers can and often do fit the same profile of not being well informed. The small traders tend to jump on the bandwagon after a change in price direction has been initiated primarily by the actions of the large traders who are generally skilled market analysts involved in the daily market.

Participants in the cash market are often dramatically different in terms of the frequency of their exposure to the market, their ability as market analysts, and their access to a broad base of information. The small investor may be in the treasury bill market only once a year when he puts together \$10,000 to invest in the cash market. Portfolio managers with the large banks are in the futures daily. A Cornbelt cattle feeder may

sell cattle only once a year. Market analysts with the packing firms, the large feedlots, and brokerage houses try to stay on top of cash and futures markets for cattle every day. The Midwest corn farmer will be prone to base his expectations of the corn market on what he sees around his area in terms of crop potential. The analyst with the major grain exporter or the large brokerage firm will make an attempt to know what the weather and crop conditions are all over the country and around the world and often employ their own meteorologists. Often, they will travel to other producing countries or through the producing regions of the U.S. to get first-hand information on crop prospects. It is not surprising, given the makeup of the markets, that the futures market sometimes reacts more quickly to new information.

Research efforts are continuing to emerge, but the consensus appears to be toward the presence of major components of interaction between the cash and futures markets.² Complex analyses show that for some commodities, the futures market is more efficient than the disaggregated and geographically dispersed cash markets and does register the influence of action types of information change first. Those same analyses, however, also often show a lagged response in the futures to earlier developments in cash, suggesting that the cash markets do react first to certain types of information. Overall, the two markets tend to interact and work together.

Simply observing that futures markets react or change before cash markets do is not sufficient grounds to conclude the move in the futures market caused the subsequent move in the cash market or brought a price move that would not have been eventually realized in the cash market. The quicker move in futures, when it develops, may be evidence of a highly efficient, effective price discovery process in the futures market.

Any causality that does consistently flow from futures to cash will often be across a longer time period than the day-to-day variations in the market. Over time, activity in the futures market does get involved in the price discovery process in the cash market by exerting an influence on the level of supplies. *Under these conditions, a causal flow from futures to cash would be expected.* Further, this type of causal flow is very important because it tends to moderate the supply–demand imbalances that would otherwise tend to evolve.

Consider, for example, the situation facing corn farmers who are trying to decide whether to hold their corn in on-farm bins or to sell at harvest. Assume it is November and they are considering selling in November or holding in storage until the following May. As a farmer, you will need to consider the following:

1. The current cash price: assume it is \$3.00.
2. All costs of holding until the following May—interest on the money tied up in the stored crop, shrink, spoilage, and any other variable costs of storage: assume these costs total \$.30 per bushel from November to May.
3. The expected change in price between November and May.

²This is especially true in the livestock commodities. In the grains and oilseeds, it is more nearly accepted that the futures markets provide much of the price discovery activity. Among the studies that show interaction across the markets in the livestock markets are Charles E. Oellermann, B. Brorsen, and P. Farris, "Price Discovery for Feeder Cattle," *The Journal of Future Markets*, Vol. 9, No. 2, April 1989, pp. 113–121, and Michael A. Hudson and W. Purcell, *Price Discovery Processes in the Cattle Complex: An Investigation of Cash-Futures Interaction*, Va. Ag. Exp. Sta. Bul. 85–12, Blacksburg, VA, Fall 1985.

To make storage equally profitable to selling in November, producers facing these conditions must receive a price of at least \$3.30 in May. One alternative is to look at the May futures for corn to see whether you can hedge a profit to your storage operation. Let's assume there is evidence to show the local cash market tends to run \$.20 per bushel under May futures around May 1, reflecting a closing basis expectation of −\$.20. If May futures are trading at \$3.50 on this particular day in November, the situation is:

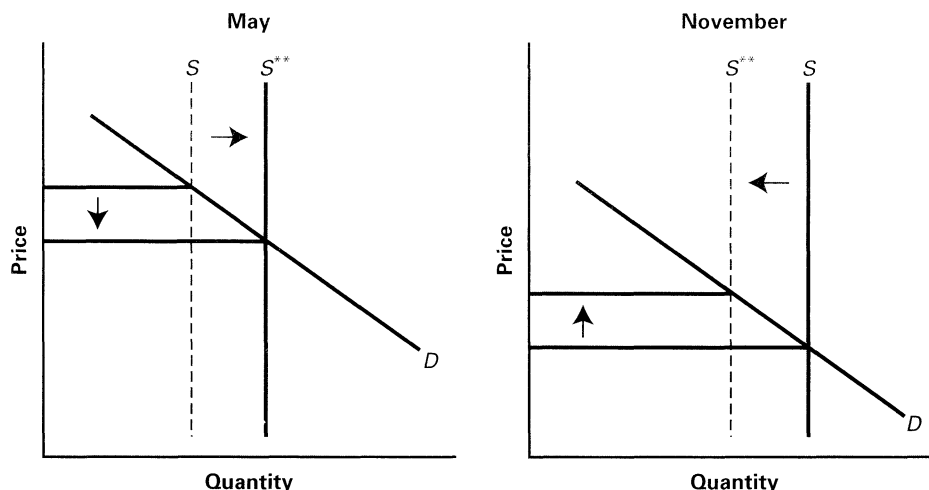
$$\begin{array}{rcl}
 \$3.50 & \text{May futures} & \\
 \underline{-.20} & \text{to convert futures to local cash equivalent} & \\
 = \$3.30 & \text{forward price for May} & \\
 \underline{-.30} & \text{costs of storing} & \\
 = \$3.00 & \text{net price to the hedged storage program.} &
 \end{array}$$

This store–sell decision was discussed in some detail in Chapter 2, and the rule developed there was to store if the projected basis improvement exceeds the cost of storage. When that rule is met, the stored product *can* be hedged or forward-priced at a profit. But a review of that detailed decision criterion is not needed here. *The objective here is to show the interaction between the two markets and to demonstrate how the futures market does exert influence on the cash market.*

At a \$3.50 trading level for May futures, you face a break-even position. You would probably sell the cash grain in November because there are still some uncontrollable risks, such as the basis risk associated with storage introduced in earlier chapters. But if May prices move well above \$3.50, you and other farmers would be encouraged to store. This will decrease sales in the November period and tend to boost cash prices. It would be logical to argue, then, that higher prices in the May futures tend to *cause* higher cash prices in the November period because the level of the May futures prices, and changes in those prices, will influence storage decisions. Note that to the extent farmers store because the May futures price is high enough to allow a profit to storage, the product is being distributed across the crop year and made available throughout the year. There *is* a causal influence here, and we would expect the markets to work this way. Storing and selling May futures to hedge the inventory will boost cash prices at harvest, depress the May futures as they are sold to place short hedges, and generate basis levels during November at which the very efficient holder of corn would face essentially a break-even situation. The market relationships would then be back in equilibrium. There is clearly a parallel in the spring months when the farmer is attempting to decide whether to plant soybeans or corn. The decision might be influenced by the springtime trading levels of November soybeans and December corn futures. There are other similar settings including the banker trying to decide which way interest rates will move and the cattle feeder who watches the relationship between live cattle futures and costs of producing a slaughter steer in deciding how many cattle to feed.

Futures markets expand the set of alternative courses of action open to decision makers and provide an input to many basic economic decisions such as the storage decision, decisions on what to produce and how much, decisions on whether to seek protection against rising interest rates, and decisions on placing feeder cattle or feeder pigs into feeding programs. These types of decisions will influence cash prices because they influence the supply of product being offered or produced both now and later.

FIGURE 12.1
Price Impacts of Storing
Grain from November
to May



Before leaving this point, it is important to recognize the possible implications of the futures market being brought into decision processes. In the preceding illustration, it is clear that a November trading level above \$3.50 in May futures will encourage storage. The outcome will be fine for the producer who decides to store and forward-prices or hedges by selling May futures. But there is another potential use—a misuse—of the futures markets. *Those producers who view May futures prices as a prediction of cash price and base their November decisions to sell or store on that “prediction” are asking for trouble if they do not follow through and hedge the grain.* If enough producers respond to this type of stimulus and misuse the futures in this way, it is possible that cash prices in May will be down. Supply is being shifted from November out toward May, and if this shifting is overdone and exceeds expectations of those trading the futures, price expectations for the following May will surely fall as the information filters into and through the markets. Figure 12.1 shows the graphics. Price will tend to be pushed up in November, down in May.³

The futures markets are not, as a rule, perfectly accurate predictors of later cash prices.⁴ The futures markets, we have found, do not have to be good predictors of cash prices to provide an effective hedging mechanism. *It is the behavior of the basis that determines the effectiveness of hedging programs.* Much of the negative attitude toward futures among producers and producer groups can be traced back to those who have misused the markets as cash price predictors and then argue the futures market caused their problems. At any point in time, the futures quote is the consensus of what

³In the graphical presentation, there is no need to worry about the *magnitude* of the price changes. As producers and/or elevators decide to store because the May futures are high enough to justify storage, these actions do in fact increase the cash price in November and push the May futures lower if the cash grain is not sold, is stored, and is hedged by selling May futures. The different between November cash and May futures prices *during November* will be decreased and the stimulus for storage will start to disappear. That is what Figure 12.1 is designed to demonstrate.

⁴Later in the chapter, evidence will be provided that suggests the futures are typically as effective as our best efforts in terms of complex econometric models. It is in fact a difficult area in which to be accurate because so much of what happens comes from a largely unpredictable behavioral response by all the decision makers involved.

the price will be at a later time period. But that consensus is based on available information, and we have seen over and over that the information base is constantly changing. Discovered prices for later time periods must change accordingly.

Futures markets should not be used solely as predictors of cash prices. Decision makers who have no intention of using the futures market to forward-price via a hedge should be careful not to bring futures prices into their decision models as predictors of cash prices in making hold-sell storage decisions or in deciding, for example, which crop to plant.

At the other end of the continuum, the issue of causality is anything but simple. Analysis to measure the direction and magnitude of causality is difficult. The references at the end of this chapter will provide detail if you want to pursue this area.

In general, the research shows futures-to-cash causality on a day-to-day basis in those commodities in which the pricing function is essentially committed to the futures market. This includes many of the storable commodities such as corn, wheat, and soybeans. At a central point in Illinois, for example, the cash bid available to the corn producer for immediate delivery of corn is determined by

Nearby Futures⁵ + Basis = Cash Bid.

The price discovery action occurs primarily in the futures market. Cash bids tend to move with the futures quotes. The cash bid for any particular day is tied to the closing price for futures on the previous day and then adjusted, on some occasions, during the day.

After dramatic moves in futures due to new information, such as a crop production estimate that is unexpectedly high or low, a manager in the cash market is sometimes observed to adjust early-morning bids to what he or she *expects* to happen in the futures market later in the day. A manager may *take protection* by adjusting cash bids.

Assume, for example, that the futures market for corn drops the daily allowable limit of 12 cents per bushel on a Tuesday. Early Wednesday morning, the manager of the cash elevator might take protection by lowering cash bids in anticipation of a further drop in futures when the corn futures market opens at 9:30 central time. With at least some “overnight” trade now being conducted for buyers and sellers around the world, there will even be some information on how much futures will change when the trading switches to full blast at 9:30. The task of discovering price is thus being essentially left to the futures market and there does appear to be causality from futures to cash. But we need to keep in mind that there *is* interaction. *What the elevator managers do in the cash market can influence trading levels of the futures.* If producers’ selling of corn essentially stops after the elevators drop their bids, analysts trading the futures will start to register the resistance of producers to lower prices. *The future prices can be supported by those producers’ reactions as those reactions are regis-*

⁵Corn futures, the reader should recall, are traded for the months of March, May, July, September, and December. The “nearby futures” rule is applied to the closest contract up to the first day of the month. For example, the December contract will be used during October and November until November 30. Then, a switch is often made to the March contract on December 1, to the May contract on March 1, and so on.

tered in the cash market. Later in the trading day, any early decline in futures may disappear.

The elevators may remove the “protection” as it turns out it was not needed. Thus, actions in the cash market can and do feed influence into the futures market.

The much-discussed live cattle futures fall in a category of commodities in which the direction of causality is less apparent. Analysis to determine the direction of causality is difficult in terms of both methodology and analytical techniques. The reference by Hudson and Purcell cited in footnote 2 in this chapter, and listed at the end of the chapter, examines the issue for live cattle. The researchers found no strong evidence of unidirectional causality between daily futures and cash prices. There *was* evidence of bidirectional causality, suggesting that the two prices are in fact discovered in the same supply–demand setting and receive impact from the same sets of information. In the live or fed cattle market, there is no strong evidence that the futures market is always more efficient in receiving, and registering the impact, of new information. The futures market does not dominate the cash market. In 1987, a study by the General Accounting Office, in response to a major controversy concerning the role of trade in live cattle futures, found no evidence that the futures market was dominating cash markets in a detrimental way. In a February 1990 study, Weaver and Banerjee reached the same conclusion with regard to live cattle futures. But we still hear, in the late 1990s, strong criticism of trade in live cattle futures.

For nonstorable commodities, the question of causality requires research and analysis. Examination of the limited studies reveals no strong evidence that futures prices unilaterally cause cash price movement or vice versa. The two prices appear to be discovered simultaneously with each market “feeding” information over to the other, often with time lags of one or more days.

Futures Trade Increases Variability in Cash Prices

This charge led to legislation in 1958 to stop trade in onion futures. Similar changes were leveled against futures trade in many commodities throughout the 1970s, 1980s, and into the 1990s. The situation is difficult to assess for the following reasons:

1. *Price variability in virtually every commodity—food, fiber, or any other—increased dramatically during the last few decades.* Increased exposure to the world market, especially recently via NAFTA and GATT,⁶ the removal of strict production control programs in many of the agricultural commodities, and increasing levels of inflation during the 1970s and early 1980s were among forces ushering in the price variability. The 1996 farm bill legislation removed acreage controls on most of our food and fiber crops, and most analysts expect to see still further increases in price volatility. To observe that this variability occurred and is occurring during the period that has seen a dramatic increase in trade in commodity futures is not a sufficient reason to argue that trade in futures caused increased price variability. Correlation or association does not mean causality.
2. *Analysis to test a hypothesis in this area is complex.* Comparing price variability in the cash market before the advent of futures trade with variability after the

⁶Reference is to the North American Free Trade Agreement (NAFTA) and the broader General Agreement on Tariffs and Trade (GATT).

advent of futures trade is difficult. Comparisons are not appropriate unless all other significant causes of cash price variability can be controlled or eliminated. Such control of other forces is very difficult to accomplish in economic analyses.

3. *The level of price variability is a function of which prices are measured.* In general, daily prices will be more variable than weekly, weekly more variable than monthly, and so on, when variability is measured by statistical measures such as variance or the coefficient of variation. If the futures market is an efficient market on a day-to-day basis, then the daily prices in cash might be more variable than weekly or monthly cash prices because they are being discovered in the presence of the highly responsive futures market. But this does not mean the variability in monthly or quarterly prices will also increase. The short-term response to daily changes in supply–demand information that is registered in the futures markets might eliminate the emergence of a supply–demand imbalance and major changes in monthly or quarterly prices at a later date. For many commodities, the monthly or quarterly prices will be more important to the economic well-being of the firms involved.

The research by Hudson and Purcell attempted to get at this issue by dividing the variability in daily cash and futures prices for live cattle into systematic and random components. The systematic component of day-to-day price changes is that portion attributable to changes in information in the underlying supply–demand situation. The random component is the portion attributable to imperfections in the pricing process. During the 1970s and into the 1980s, as the volume of trade in live cattle futures increased dramatically, the variance or variability of the systematic component of the cash price series decreased and the variability of the random component increased. Those results suggest that the presence of trade in futures tended to *decrease* the variability in the cash market. As noted earlier, Weaver and Banerjee reached a similar conclusion. The presence of trade in live cattle futures does not increase, in a statistically significant way, variability in cash cattle prices.

Trying to determine whether the variability of cash prices is significantly influenced by the existence of futures trade is a difficult research task. More work is needed. To date, there is no strong evidence to support the claims of critics who argue futures trade increases variability in cash prices. Most of the available research, in fact, concludes that the presence of futures markets decreases variability in the related cash market across a number of commodities by increasing the effectiveness and efficiency of supply response to price changes.

THE SUPPLY RESPONSE ISSUE

Evidence on the accuracy of futures quotes as predictors of cash prices is mixed, but that should be no big surprise. The potential for a short-run supply response, especially in the agricultural commodities, can mean futures quotes will turn out to be inaccurate predictors. But the same difficulty faces the econometric models designed to predict prices. An early study by Just and Rausser⁷ indicated that the future markets

⁷Richard E. Just and G. Rausser, "Commodity Price Forecasting with Large Scale Econometric Models and the Futures Market," *American Journal of Agricultural Economics*, Vol. 63, No. 2, May 1981, pp. 197–208.

for many commodities are just as accurate in predictions as the complex econometric models. The potential of an unexpected supply response is a primary difficulty in any attempt to forecast prices, and this area needs further discussion.

To illustrate, let's assume that it is October 1 and a midwestern hog-corn farmer is trying to decide whether to buy gilts for breeding to expand the breeding herd. From the date of breeding, it will take about nine months to have added slaughter hogs ready to sell. What information does the decision maker use in making the decision?

The current prices for hogs, corn costs, interest rates—all these and other traditional economic variables will be brought in. *But some type of price expectation will have to be included, and marketing economists are increasingly recognizing that the distant futures quotes are being widely used as price expectations.* In this illustration, our midwestern producer might look at the October 1 trading levels for the June or July hog futures for the next year.

What if, on October 1, the distant July lean hog futures contract is trading near \$75? At current corn costs, the producer estimates his break-even cost for lean hogs on a carcass basis at \$60 per hundredweight. A \$75 selling price would mean profits of nearly \$28 per hog for a 250-pound slaughter hog that produces a 185-pound carcass.

If many producers look at the same price expectation and decide to expand, the increased supply of hogs the following summer could push the price well below \$75. But the marketplace will have a hard time deciphering just what is going on in the hog sector until the December and the March quarterly *Hogs and Pigs* reports are released by the USDA. Then, if the expansion is greater than has been expected, the futures prices will decline—and the current cash market could also drop as expansion plans are aborted and some gilts are sold in the cash market.

Analysts who examine the efficiency of the futures markets would argue that the futures market should be able to incorporate the expected expansion and not get caught showing distant futures prices that are, in an *ex post* context, too high. But there are two difficulties with this argument.

First, it is always difficult to anticipate how strongly decision makers will react. It is easy to find periods in which profit indicators were at only moderate levels and a major expansion developed. In other periods, those same profit indicators were higher for several calendar quarters before even a modest expansion was launched. Most analysts would agree that 1986 was the most profitable year for hog producers in the 1970s and 1980s, but there was a net liquidation of hog numbers during the year in many of the producing states. Hog producers were using their profits to pay off debt.

There were good profits in 1987 and parts of 1988 and 1989, and cash prices pushed well above \$60 on a liveweight basis in early 1990. Still there was no expansion. Due to their financial position, producers may periodically use the better hog prices to reduce debt versus launching an expansion. In addition, banks or other lending agencies are notorious for being conservative about expansion if they have seen any recent period of forced herd liquidation due to low hog prices. A similar pattern developed in 1996 and 1997. Lean hog futures prices for the summer months of 1997 traded above \$80 per hundredweight—but there was little or no expansion. Hog prices had dipped below \$30 on a liveweight basis (below \$40–41 on a lean weight basis) in late 1994. Record high corn prices developed late in 1995 and through the summer months of 1997. Bankers, and producers, remembered and were reluctant to expand until late in 1997 when corn was much cheaper and some of the losses, and debts, of 1994 had been covered. But when expansion came, it came with gusto. Pork production in 1998 may be up as much as 10 percent compared to 1997. *The behavioral reactions of producers are very difficult to anticipate correctly in terms of magnitude and timing.*

The second difficulty comes in the form of concern over the adequacy of the available set of information. It is difficult to discover the correct price for some future time period when the widely used information (*Hogs and Pigs* reports, in this example) is released only quarterly and is subject to a sampling error of up to 3 percent in either direction. Research by such authors as Colling and Irwin⁸ often concludes that the sustained moves up or down in the futures markets are the results of “information shocks” when periodic reports are released and are not the result of any inefficiency in the futures markets.

The debate will continue, but it is important to remember that a short-run supply response within the year is possible in hogs and in the cattle-feeding sector. Even in the crops, acreage can be switched at the last minute from corn to soybeans, from soybeans to cotton, and so on, in response to changes in price expectations. During the period of heavy reliance on the subsidies from governmental programs (prior to 1996), price expectations influenced program participation and therefore exerted a significant influence on planted acreage. Each time prices trend higher, there was always talk about what price would be required to cause producers to abandon the programs and plant all their acreage versus meeting the set-aside requirements to be eligible for program benefits. If producers’ reactions are bigger or smaller than the marketplace expected, the futures quotes for the fall contracts, prior to planting time in the spring months, will invariably be too high or too low when the harvest period arrives. And since 1996, even the modest attempts by the USDA to manage the supply side of the price equation in key crops are gone.

The possibility of a supply response will exert significant influence on the cash futures relationships and on how accurately futures prices can predict final cash prices. In assessing the efficiency of the futures markets, we need to keep in mind the related issues of behavioral responses by producers and the adequacy of the information base in the areas the future markets are helping to discover prices. At best, it will be difficult for the futures markets to anticipate correctly the magnitude of the behavioral response of producers of agricultural commodities, especially in commodities in which publicly available supply-demand information is infrequent and subject to sampling error.

THE CONVERGENCE ISSUE

In earlier chapters, there was reference to the threat of delivery that forces convergence in the cash and futures markets. This is an extremely important determinant of the relationship between cash and future prices. *If the cash and futures markets do not converge to some expected level of basis with a useful degree of reliability, the hedging process will not work effectively.* It would do no good for you as a decision maker to expose yourself to a level of basis risk that parallels the level of cash price risk you would face if no hedging is done. Critics of trade in futures often argue the convergence is not reliable and that the futures markets are therefore not an effective risk-transfer mechanism.

⁸Phil L. Colling and S. Irwin, “On the Reaction of Live Hog Futures Prices to Informational Components in Quarterly USDA *Hogs and Pigs* Reports,” *Proceedings*, NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, Chicago, April 20–21, 1989, pp. 17–35.

Whether we are talking about corn, hogs, cotton, cattle, or financial instruments, it is the possibility of delivery that forces the needed convergence. Both hedgers and speculators get involved in making the system work.

Let's look at fed or slaughter cattle to illustrate. There is a provision in the live cattle futures contract that allows for delivery at several designated points and, since June 1996, delivery can be either on a live or carcass-evaluation basis.

The delivery period for any commodity starts at a previously scheduled date around the first of the month for which a futures contract is being traded. As the delivery period approaches, we will find that futures prices will not be allowed to stay above cash prices by more than the costs of delivery.

Assume it is June 1 and the June live cattle futures are trading at \$75. Cash (deliverable) cattle near a delivery point are selling around \$71. A feedlot with a short position in futures could announce its intention to deliver its cattle under the futures contract by tendering a certificate for delivery. The procedure is a bit more detailed than this, but the cattle feeder is looking at a \$75 futures price with roughly a \$1.50 cost of delivery and a net price for cattle delivered under the provisions of the futures contract of \$73.50.

The estimated net price from delivery is \$2.50 per hundredweight above the cash prices. Cattle feeders and other holders of short futures position would continue to deliver as long as this situation prevailed. The delivery process means short futures positions held by the cattle feeder as hedger (or others) do not have to be bought back and that tends to let the futures market decline. Persons holding long positions in futures, especially speculators who do not want to receive delivery of cattle, rush to sell futures to offset their long positions before they face the risk of being assigned to take delivery. The futures are forced lower by the selling actions of these holders of long futures positions. Convergence to a basis level approximating the costs of delivery during the delivery month is assured.

Traders or speculators, acting as arbitrageurs, also help to assure convergence. A knowledgeable trader on the cash market could sell the futures at \$75, buy deliverable cattle, and announce intent to delivery points is very important and helps to ensure complete convergence. *The markets will converge to a reasonable approximation of the delivery costs and that is all that is required for the hedge to work.*⁹

If the cash market is above the futures, a less frequent scenario, another set of actions is required. Long hedgers who can kill and process the cattle hold their long futures positions rather than selling futures to offset. If, for example, the futures were \$68 and the cash market \$71, the long hedger (a packer, for example) could just wait to be assigned delivery.¹⁰ Since the short hedger or other holder of short positions

⁹Analysis shows that the cash-futures basis in all delivery points tended to average $-\$1.00$ to $-\$1.50$ over time. The average basis for a particular month may occasionally widen toward $-\$2.00$, but these variations are infrequent, and the basis risk or possible basis variability was still far less than the $\$5.00$ to $\$10.00$ moves in the cash market that are fairly common occurrences. The change in June 1996 moved the futures contract specifications to a higher-quality level, and producers of lower-quality cattle may now face an average basis of $-\$2.00$ or even $-\$3.00$. But the hedging process is still effective if convergence to the expected basis levels occurs.

¹⁰Under the certificate of delivery systems used in live cattle, the packer or other long hedger can specify the delivery location at which they are willing to accept cattle. This provision protects them against the possibility of being assigned delivery at points not convenient to their plant locations. The article by Purcell and Hudson in the America Enterprise Institute series cited at the end of the chapter provides more detail.

who delivers pays delivery costs, the packer could be facing a \$3 per hundredweight lower cost of cattle via delivery than via buying in the cash market.

The examples are a bit extreme but the procedure illustrated is valid. In both cases, we should recognize that some exposure to uncertainty is involved. The cattle feeder, or other trader seeking profits by delivering cattle, faces some uncertainty about whether the cattle will be graded at the needed level and will in fact be deliverable without penalties. The process can take more than one day to complete, so the spread between futures and cash that prompted delivery can change while the delivery process is being completed.

When the cash market is above futures, the long hedgers have to hold their positions and wait for cattle to be assigned. The holder of long positions cannot initiate the delivery process. That initiative is always with the traders holding short positions. The advantage associated with being willing to accept delivery can start to disappear as the last delivery date approaches and the packers face the risk that holding the long position in futures will not always work to lower cattle costs.

In any other commodity, any financial instrument, or anything for which there is futures trade, the process is similar. *The possibility of delivery forces the needed convergence.* For future contracts that use the cash settlement process instead of physical delivery, the economic forces that prompt cash futures convergence are the same. Arbitrage between futures and cash by knowledgeable traders will force cash-futures coverage.

Logical economic forces ensure convergence. For commodities requiring physical delivery (fed cattle, corn, etc.) the process of convergence is slower when the cash prices exceed futures prices during the delivery period. Users holding long positions have to wait until essentially the last delivery day to force convergence.¹¹ As long as there is economic advantage to be gained by delivering or accepting delivery, the hedger is protected from exposure to a level of basis risk that would approach the level of price risk in the cash markets. There is reason, therefore, to be a hedger versus a cash market speculator.

Basis Problems

Problems of unpredictable basis behavior or lack of the expected futures convergence can and do arise. Generally, it is argued that the producer or other potential hedger who is located at some distance from a delivery point will not be able to hedge effectively because of unpredictable variations in the basis—what we are calling basis risk. One result is a persistent request to the CME, CBOT, or other exchanges for more delivery points. But those requests are usually resisted by the exchanges.

Adding more delivery points does not necessarily improve the effectiveness of hedging programs. No product or commodity will command the same price in all geographical locations. Corn, for example is worth more in New Orleans where it is accessible to the ships involved in world transit than it is in a farmer's storage bins in central Iowa. In the livestock sector, the geographical price spreads can be very large.

¹¹The perceptive reader will ask the question, Why not let the trader holding the long position initiate the delivery process? This possibility is being discussed. The contracts and delivery procedures are adjusted over time to make sure trade in futures offers an effective and viable hedging or price risk transfer mechanism.

Feeder cattle (600–800-pound steers) will command a higher price in the Amarillo, Texas, area than in Alabama because the feedlots that need those steers are concentrated in the Southwest. When Montgomery, Alabama, was made a delivery point for feeder cattle a number of years back, delivery there was discounted significantly compared to the par delivery points in Oklahoma City, Kansas City, and so on. But the discount was set at a constant \$6 per hundredweight, and that created an added problem: the difference between cash prices in Montgomery and in Amarillo was not constant throughout the year. (This and other problems helped prompt the move to cash settlement in feeder cattle.)

If the difference were a constant \$6, then we could argue that hedges in Alabama would be just as effective as those in Texas without the Montgomery delivery point. The Alabama producer would face the following:

$$\text{Futures Price} + \text{Basis} = \text{Forward Price}.$$

The forward price in Alabama would in fact be lower than that in Texas because the basis adjustment is not only negative but is larger in absolute terms. But that would not contribute to basis risk if that adjustment was just as reliable and predictable as the smaller adjustment in Texas. We could suggest then, that the effectiveness of hedges in Alabama will be related to the stability of the intermarket differences in the cash markets. If the relationship between the cash markets is stable, the effectiveness of hedges is not influenced by access to a nearby delivery point.

The magnitude of the basis adjustment is not a determinant of the effectiveness of the hedging program. It is the stability or predictability of the basis that is important. It follows, therefore, that if intermarket cash differences are stable, the hedge in the area distant to the delivery point will be effective. And it is important to recognize that where cash settlement is feasible, the hedge can be even more effective.

CASH SETTLEMENT ISSUES, CONCERNS

In recent years, there has been strong interest in moving to cash settlement as opposed to physical delivery of the product. The move started in the financial futures and stock index futures where “cash settlement” has facilitated a huge expansion in activity. Interest in cash settlement has spread to the agricultural commodities as well. It is a controversial issue.

There are apparent advantages to cash settlement. Delivering the actual commodity always requires costly transporting and handling of the commodity. In the livestock sector, long hedgers who accepted delivery of cattle have long complained about the poor condition of the livestock after they go through the delivery procedure.

The advantages to cash settlement are

1. Reduced costs of “settling” futures positions,
2. Elimination of the need to transport the product,
3. Possible improvement in performance of the basis, and
4. Alignment of the expiration of the futures contract and the maturity date of the options on the futures.

The reasons for advantages 1 and 2 are apparent. Advantage 3 is a researchable issue, but research evidence does suggest improved basis performance in commodities such as feeder cattle after the change to cash settlement starting with the September 1986 futures contract. Basis appears to be less variable since the advent of cash settlement.

Advantage 4 is important. With physical delivery, the announced expiration dates for options are well in advance of the expiration date for the underlying futures contract. The August live cattle futures contract, for example, will always expire on August 20 (if not a holiday or weekend), but the expiration date for the options on the August contract will be set during the last half of July.¹² The time is needed for the logistics of the delivery process to be handled.

The holder of a put option has the right to a short position in the underlying futures at a prescribed strike price. If the futures prices fall below the strike price, the right to a short position will increase in value as the futures market declines. Normally, the buyer or holder of the put option just sells the option at its increased value (higher premium) and thus gains the needed protection against declining cash prices. But the holder of the put also has the right to exercise the option and request a position in the futures market.

The buyer of the put option might elect to exercise and demand a short position in the futures if the premium on the option is not increasing enough to fully reflect the decline in the underlying futures market. Alternatively, the holder of the put may feel the cash futures basis is too wide and would want to be assigned a short position in futures so delivery would be possible. Clearly, there are problems that emerge from the early expiration of the option. *With the option expiring before the delivery period for the futures begins, the producer choosing to use options to forward-price is denied the possibility of getting involved in the delivery process even when the basis is not at expected levels.*

In terms of procedure, cash settlement is simple. As the expiration date, holders of long and short positions in the futures simply have their accounts settled by using the current level of the cash price series. For example, if the cash price series for feeder cattle is \$81.25, all futures positions that have not been offset will be settled using the \$81.25. A short hedger who sold the futures at \$84.50 would be credited with \$3.25 per hundredweight. A short hedger who sold at \$78.00 would see his futures account settled via a debit of \$3.25 per hundredweight. The holder of a long position at \$80.00 would be credited with \$1.25 per hundredweight.

Cash settlement is not a cure-all, however. Some of the issues were discussed briefly in earlier chapters. *It is extremely important that the cash series used for settlement be representative of trade in the cash market, be competitively determined, and be free from potential manipulation.* If the cash series can be influenced by a single buyer or seller in the cash market, that firm can enhance the value of futures positions to its advantage by exerting pressures designed to change the cash-price series.

For example, a holder of short positions at \$84 in feeder cattle will clearly benefit if the cash price series can be forced down to, say, \$79, before cash settlement of futures positions is completed. Holders of long positions in the futures would want to see the cash series forced up as much as possible to enhance the profitability of their futures positions.

¹²Early in 1990, the CME proposed changes that would move the maturity date of the options on live cattle futures to a date early in the delivery month for the maturing futures contract. This was done, and in 1997 discussion continues about moving the maturity date of the options to still later dates.

Attempts are made to minimize the possible problems of cash price manipulation by using a broadbased index. In feeder cattle, a weighted average of cash prices spread across numerous markets in 27 states was initially used. Later, this was changed to markets across 12 midwestern states. It is difficult to conceive of any one firm being able to influence such a broad cash market.

In other commodities, such as the fed cattle traded via the live cattle futures, the solution is not so apparent. There are far fewer markets or geographical areas with active fed cattle trade in the cash market. And since the mergers and acquisitions of the late 1980s, as few as four firms slaughter 80 percent or more of the steers and heifers that go into the boxed beef trade. In this type of situation, there is usually an attempt to broaden the base for the cash-price series or index by using cash prices for heifers as well as steers or by bringing in a related series such as the boxed-beef-value series that involves retail-level activity. Still, there is and should be concerns about moving to cash settlement procedures when there is any chance the cash-price index could be manipulated. A study by Kahl, Hudson, and Ward¹³ recommended against moving to cash settlement in the live cattle futures because of the concern that the cash-price index could not be constructed such that it would be free from potential manipulation.

Cash settlement moves are being discussed again in the late 1990s. The USDA is collecting cash prices more broadly, and some feel the move to cash settlement is feasible. In hogs, the move has already been made. The CME is shifting to a “lean-hog” futures contract that discovers price on a carcass basis and is cash settled to a cash price index collected from a number of markets. There is also always the possibility that moving to cash settlement would damage the viability of markets in which physical delivery has been allowed. Part of the downward-trending volume in fed cattle at Omaha and Sioux City, for example, is the delivered cattle under futures contracts. If either of these markets were to disappear because of a move to cash settlement for live cattle, producers selling cattle in those markets will have lost their access to one of the few remaining terminal markets.

Cash settlement of futures positions has obvious advantages in that it reduces the costs of delivery and eliminates the time difference between maturity of the futures and options on futures. If it is to work effectively, however, the cash series must be free of potential manipulation by large firms who deal in the cash market. In highly concentrated markets such as the fed cattle markets, there are reasons to be concerned about the immunity of cash-price series from possible manipulation.

AN OVERALL OBSERVATION

You might reasonably observe that the futures markets have not been effectively criticized at all to this point in this chapter. Are there no negatives? There are but the purpose here was to deal with the long-standing areas of controversy.

There are bad players in the futures markets as in any sector. The FBI sting made public in 1989 revealed some of the problems that can come up on a day-to-day basis.

¹³Kandice H. Kahl, M. Hudson, and C. Ward, “Cash Settlement Issues for Live Cattle Futures Contracts,” *Journal of Futures Markets*, Vol. 9, No. 3, June 1989, pp. 237–248.n

Too often, brokers are paid strictly on commission, and that has undoubtedly contributed to their tendency to pressure the user to trade too often. *Under that type of pressure, what are hedging programs can turn into speculative programs in the futures when the original idea was to avoid speculation in the cash market.*

Trade is too thin in the distant contracts in some commodities for effective use of the markets. Trade in options in the distant contracts is often especially thin, but the options are still relatively new. It is not always apparent that the exchanges are doing all they can to encourage trade in the distant contracts. Trade in the distant contracts was encouraged back when long-term capital gains were treated differently. There has been no obvious effort to look at ways of restoring trade in those sometimes thin contracts that are six months or more in the future.

The price discovery component of the feeder cattle market appears to be weak. Since the move to cash settlement in September 1986, all the feeder cattle futures prices appear to be “tracking” the cash index very closely. On some days, there is no more than a \$.35 per hundredweight spread in the settlement prices of all contracts being traded. This area needs more investigation. The CME has made changes in the feeder cattle contract, but its price discovery function could still be criticized.

In recent years, trading funds have moved into the agricultural commodities, especially in corn, soybeans, wheat, live cattle, and lean hogs where futures trading volume is significant. Many of these funds trade strictly on technical indicators with little regard to supply–demand balances or imbalances. Research by Murphy indicates these funds may hurt the effectiveness of price discovery in live cattle futures, and many observers would argue that the same is true for other commodities. The CFTC continues to look at their monitoring and enforcement policies with regard to trading funds.

Certainly some areas could be criticized. *There is an ever present need to make the futures as useful and productive as possible.* The exchanges, the federal regulatory agencies, and users all have a responsibility here.

SUMMARY

Misconceptions and misunderstanding of the relationship between the cash and futures markets can discourage use of the futures markets in areas of economic activity in which the price risk transfer and price discovery dimensions of the markets are needed. This chapter discusses a limited number of those issues in lay terminology.

It does often appear that moves in the futures market cause changes in cash prices, but this interpretation is too simplistic. *There are supply-response issues to be considered, and the issue of whether the underlying base of information is adequate for efficient price discovery processes deserves attention.* In general, the research findings suggest the two markets interact and work together in the pricing process. Since the futures markets are highly visible, it may be that the futures markets become the “messenger” for bad news to come in terms of pending changes in cash price. There is then a tendency to want to “kill the messenger.”

You are is encouraged to complete and review this book with an open mind about the futures markets and the use of futures markets. There is no substantive body of evidence to suggest the futures markets do anything other than their prescribed tasks of contributing to price discovery and providing effective price risk transfer mechanisms. Since the exchanges are motivated to offer a contract that works for potential hedgers, there is constant attention to possible improvements. In recent years, moving to cash settlement is receiving attention, and the willingness of the exchanges to

examine alternatives is tangible evidence of their interest in offering futures contracts and related trading procedures that fit the needs of the decision maker.

The most compelling evidence of the importance of the economic functions performed by trade in futures is the rapid growth in the number and types of contracts offered and the record levels of trade at all exchanges in recent years. When risk exposure became pervasive in the 1970s and 1980s, trade in futures contracts emerged to contribute to price discovery processes and, most importantly, provide a risk-transfer mechanism. If the need were not present, the markets would not receive the widespread use we have seen in many commodities, and this growth in use levels has continued through the late 1990s for many of the futures instruments.

KEY POINTS

- Increasing exposure to price risk across a wide spectrum of economic activity suggests that a *mechanism such as futures markets is needed to allow the transfer of price risk.*
- *Trade in futures contracts does not appear to dominate cash prices and pricing in the cash market.* For nonstorable commodities such as slaughter cattle, the markets are found to interact and work together in the price discovery process.
- *Variability in cash prices is not increased when trade in futures contracted is started.* Though a difficult issue to research, the consensus of the available literature is that *variability in cash prices is decreased by trade in futures.*
- Futures prices will not typically be any more accurate predictors of cash prices than will econometric models or other analytical attempts to predict prices because *a supply response can evolve that changes the level of supply for the later time period.* Since the supply response is a function of decision makers' behavioral responses, *the futures markets cannot always correctly anticipate the magnitude of the supply response.*
- Logical economic forces involved in the delivery process *help to ensure cash-futures convergence and a predictable pattern of behavior for the basis.*
- *Cash settlement of commodity futures has significant advantages* in the form of reduced costs and alignment of futures and options expiration, *but a cash-price series that is free from potential manipulation is critically important.*
- *Widespread adoption and use* of futures contracts for hedging purposes is perhaps the most compelling and tangible evidence that *trade in futures contracts serves an economic purpose.*

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