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Hedging and other marketing alternatives for Iowa grain producers

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Hedging and other marketing alternatives

for Iowa grain producers

by

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CHAPTER I. INTRODUCTION

> "The prices of most farm products are highly variable. They change from year to year, from month to month, and from day to day. Some of them change from hour to hour, and even from minute to minute."[1]

The preceding quote emphasizes the variability of farm prices. With highly variable prices, the timing and methods of selling grain can be important influences on the net income of Iowa farmers. However, many grain producers either are not aware of all the available marketing alternatives or are not familiar enough with them to effectively manage price risks. Instead, they feel more comfortable selling in local cash markets at harvest or when income is needed later in the year, whether the price is satisfactory or not.

As an example of recent price variability, Northwest Iowa soybean prices during the 1976-77 marketing year ranged from slightly under $6.00 per bushel in the fall to nearly $10.00 per bushel in late spring. Assume a Northwest Iowa producer raised 100 acres of soybeans in 1976 with an average yield of 33 bushels per acre. If the producer marketed all of his crop at the low price, the gross receipts would be $19,800. If, however, he had marketed his soybeans at the higher price his gross receipts would be $33,000, nearly twice the revenue of the low price.

It is also important to realize that in some cases the season's

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[1] Geoffrey S. Shepherd, Agricultural Price Analysis, 3rd ed. (Ames: Iowa State College Press, 1950), p. 3.

high prices may occur when the producer is not ready to physically market his crop. For this reason, there is a need for other methods of marketing in addition to cash sales. For example, assume that the same Northwest producer planted 100 acres of soybeans in the spring of 1979 with an average yield of 33 bushels per acre. If the producer marketed all of his crop at harvest when the price was slightly under $6.00 per bushel, his gross receipts would be $19,800. If, however, he had forward contracted his crop with a local elevator in early June at a price of nearly $7.00 per bushel, his gross receipts would be $23,100, an increase of $3,300. From these examples, the importance of the timing of grain sales should be evident. The main purpose of this thesis is to develop information that will aid producers in timing marketings of corn and soybeans and in selecting profitable marketing alternatives.

Marketing Defined

Three typical definitions of farm product marketing and marketing alternatives are shown below:

> "Marketing and production are interlocked, that they depend upon each other, since we can only market products which can be produced, and we should only produce those that can be marketed."[1]

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[1]Edward W. Cundiff and Richard R. Still, Basic Marketing, 2nd ed. (Englewood Cliffs: Prentice Hall, Inc., 1971), p. 4.

"... the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer."[1]

"A marketing alternative is defined as a procedure, mechanism or system through which producers may sell, or influence the terms of sales of his product."[2]

Although these definitions reasonably define the terms marketing and marketing alternative, they lack important details that are necessary for this study. The first definition emphasizes that production and marketing decisions are interrelated; the prices available from marketing alternatives may influence the decision of which crop is most profitable to produce. However, it does not specify the exact activities involved in marketing. The second definition describes the traditional concept of marketing as covering activities from the point of initial production to the ultimate consumer. This definition should be interpreted broadly enough to include storage at the point of production and timing of the decision to price the crop. In the third definition, the terms of sale would logically include price, date of delivery to purchaser, pricing procedures, storage expenses involved if any, and other expenses such as brokerage fees.

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[1] Richard L. Kohls and W. David Downey, Marketing of Agricultural Products (New York: MacMillan, 1972), quoted in Harold F. Breimyer, Economics of the Product Markets of Agriculture (Ames: Iowa State University Press, 1976), pp. 5-6.

[2] Ronald D. Knutson, Wallace Barr, and William E. Black, "Who Will Market Your Products?" Texas Agricultural Extension Service, D-1053 March 1978, p. 3.

The marketing alternatives considered here include: (1) cash sale at harvest, (2) forward contracting through a local elevator for delivery at harvest, (3) use of futures markets to establish prices for harvest and post-harvest delivery, and (4) storage of the crop beyond harvest without forward pricing. A cash sale is the delivery of grain to an elevator or terminal and receipt of the quoted cash price for the date of delivery. In forward contracting new crop grain, the producer agrees to deliver all or a portion of the crop growing in his fields to the elevator at a later date at a specified price. Delivery can be at or after harvest, with the exact delivery date specified in the contract. In nearly all cases, grain elevators would offset these contracts through forward sales to merchandisers or through use of the futures market to protect against the risk of price changes. Techniques for pricing grain in the futures market will be described in detail in a later section.

The main concern of this thesis is with alternatives relating to timing and methods of pricing corn and soybeans. Other important marketing alternatives not considered in this analysis include those dealing with spatial aspects of marketing such as sales at a local country elevator versus hauling to a sub-terminal, train-loading station, or processor outside the local area.

A major element in evaluating the four marketing alternatives studied here is the basis. Basis can be defined as the difference between the price of a particular futures contract and the local cash price. The Chicago futures markets generally are recognized as the national and world pricing center for corn and soybeans. The basis is an indicator of differences in grain values over time and space, and is determined by the transfer costs incurred from local points to Chicago, local supply and demand conditions, storage capacities both at the local level and in Chicago, and existing delivery conditions in Chicago and other market centers. It varies seasonally and by geographic location. The basis will be discussed in further detail in Chapter 2.

Objectives[1]

To assist Iowa producers in more effectively marketing corn and soybeans, this thesis is directed toward an analysis of the four marketing alternatives listed in the previous section. The analysis reported here focused on two separate price reporting districts within Iowa; the Northwest and Southeast districts. These districts were chosen to reflect extremes in distance from Iowa to major export markets as well as sizeable differences in transportation costs and methods of shipping grain to market. Northwest Iowa ships grain primarily by rail and has been faced with an uncertain supply of rail cars for moving grain in recent years. Southeast Iowa corn and soybeans move to export markets primarily by barge shipments on the Mississippi River. Another important difference between the two districts is that barge rates are unregulated and are priced by supply and demand

[1]Several terms in this section are commonly used in discussions of grain marketing but will be defined specifically in the next chapter.

conditions, whereas rail rates are regulated by the Interstate Commerce Commission of the Federal Government. Additionally, Southeastern Iowa river shipments normally are halted during the winter months by ice on the Mississippi River. These conditions were expected to cause important differences between the cash-futures price relationships of the two districts. Differences in local cash-futures price relationships were expected to affect the returns available from various marketing alternatives.

This analysis also includes an examination of basis patterns in the Chicago corn and soybean markets. In some cases, conditions in these markets may influence local basis patterns and returns to producers from various forward pricing alternatives.

Specific objectives of the project are:

(1) To determine the costs of delivering corn and soybeans on futures contracts from three representative locations within the Northwest and Southeast price reporting districts of Iowa during the 1974 through 1979 period. These costs will be referred to as the delivery cost basis. The corn delivery cost basis will be computed for both Chicago and St. Louis to determine which location would be the logical futures delivery point from Northwest and Southeast Iowa. Futures contract specifications permit delivery at either location in fulfillment of corn futures contracts.

(2) To compute the weekly basis on cash corn and soybean prices for the Northwest and Southeast Iowa price reporting districts for the 1974-75 through 1978-79 marketing years which run from October 1

through September 30.

(3) To compare the weekly corn and soybean basis for these marketing years with the corresponding delivery cost basis. This comparison will indicate whether delivery costs set a maximum limit on the local basis, and will determine whether incentives for delivery of Iowa corn and soybeans on futures markets have occurred in recent years.

(4) To analyze corn and soybean basis changes and potential gross returns from storage hedges placed at harvest and lifted after three, six, and eight months' storage.

(5) To compute the weekly basis reflected in new-crop corn and soybean contracting prices at local elevators for harvest delivery during the summers of 1976 through 1979 and to compare these basis patterns with the actual basis that resulted during the corresponding harvest seasons. Since new-crop contracting prices for harvest delivery were first reported in 1976 in official price reports from the Iowa Department of Agriculture, comparisons for earlier years are not possible. Comparisons from 1976 through 1979, however, should indicate to what extent basis uncertainty has affected new crop contracting prices in recent years.

(6) To compute the daily Chicago corn and soybean basis for expiring futures contracts during the last twenty-five trading days for the years 1974 through 1979. Failure of cash and futures prices to converge or a widely fluctuating basis during the contract expiration month would be evidence of possible impediments to delivery

in Chicago and could adversely affect basis patterns in other areas.

(7) To compare the daily Chicago corn and soybean basis for the marketing years 1974 through 1979 with the Chicago delivery cost basis during the same period.

(8) To compute corn and soybean prices offered by preharvest hedging alternatives and new-crop contracting for harvest delivery during the early June, mid-July, mid-August, mid-September periods for the years 1976 through 1979 for the two Iowa price reporting districts.

(9) To compare the prices received from pre-harvest hedging and new-crop contracting for the years 1976 through 1979 with the prices received at harvest during the same years.

Sources of Price Data

The Marketing Division of the Iowa Department of Agriculture began compiling daily cash grain prices for six Iowa price reporting districts in 1974. Boundaries for districts used in the price reporting program are shown in Figure 1-1. In this analysis, the mid-point of reported Thursday cash prices for the Northwest and Southeast districts were used in evaluating producer marketing alternatives. If a holiday occurred on a Thursday, prices for the previous trading day were used. Iowa cash prices are compiled after the daily close of futures markets.

Futures prices were compiled from the Wall Street Journal for the years 1974 and 1975, and from files of the Iowa State University Market News Office for the years 1976 through 1979. Futures prices used here

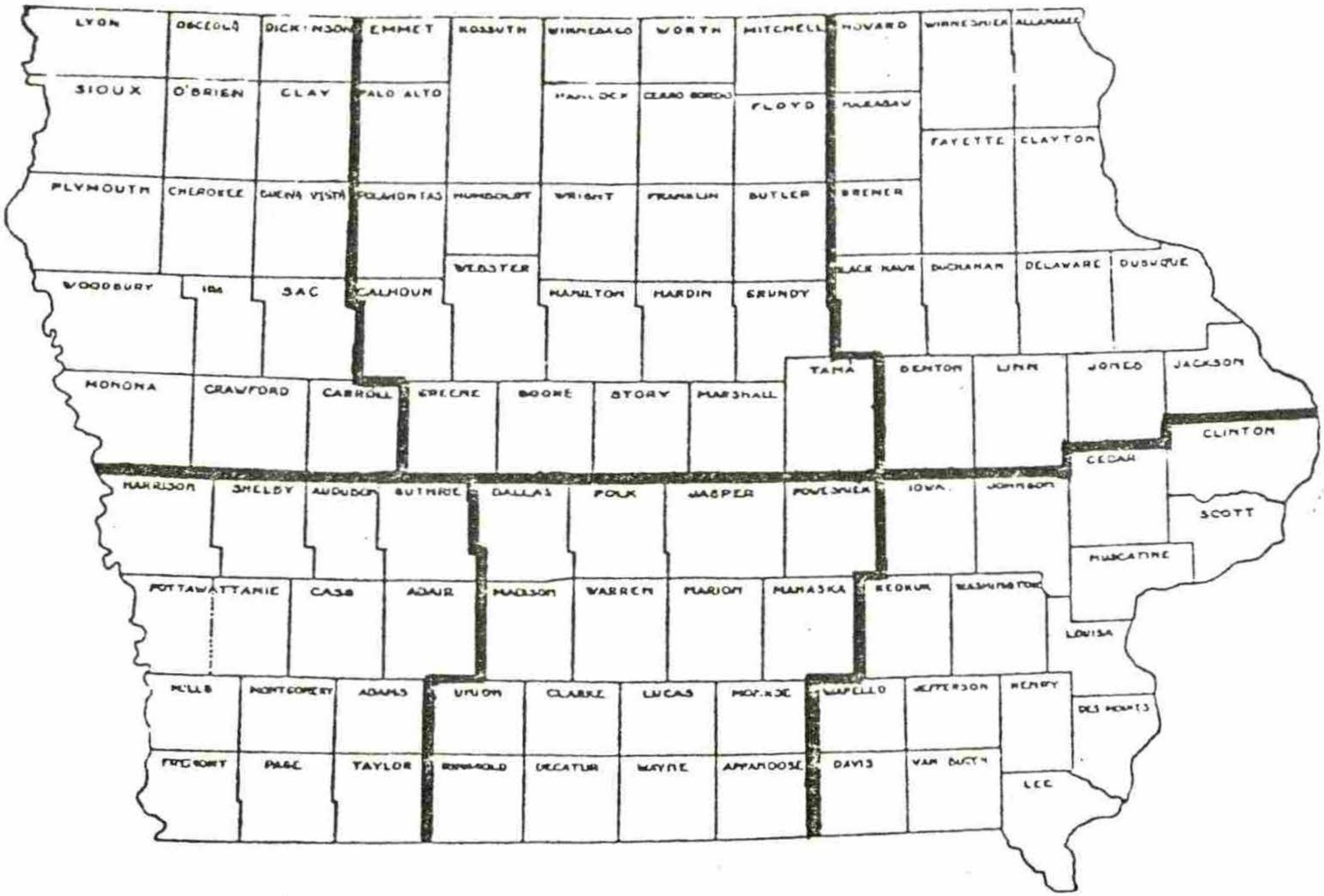

Figure 1-1. Iowa grain price reporting districts

were the midpoint of the Thursday daily closing price ranges. Again, if Thursday was a holiday, the previous trading day was used.

Chicago cash prices were obtained from daily closing prices reported in the Chicago Board of Trade Annual Summaries for the years 1974 and 1975 and from the files of the Iowa State University Market News Office for the years 1976 through 1979.

Previous Research

Previous research in Iowa relating to this subject includes a thesis entitled, "Analysis of Corn and Soybean Cash-Futures Price Relationships in North Central Iowa," written by H. Alan Carver.[1] This work emphasizes the importance of basis information in evaluating potential hedging opportunities in futures markets and in choosing among marketing alternatives. Another Iowa study by Dr. Robert N. Wisner contains a fourteen-year corn and soybean basis history for Central Iowa. This report entitled, "Basis Patterns for Corn and Soybeans in Central Iowa," stresses the importance of basis knowledge and its use in evaluating hedging opportunities.

Other related work includes a University of Minnesota study of the corn and soybean basis for Southern Minnesota for the period 1972 through 1975.[2] Additional analyses of grain hedging opportunities also

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[1]H. Alan Carver, "Analysis of Corn and Soybean Cash-Futures Price Relationships in North Central Iowa" (Master of Science thesis, Iowa State University, 1978.)

[2]Raymond Dahl and Patrick Henneberry, "Cash-Futures Price Relationships - Guides to Grain Marketing," University of Minnesota Agricultural Experiment Station Bulletin 517-1977, 1977.

have been conducted at South Dakota State University, the University of Kentucky, and the University of Illinois.[1]

Although the out-of-state studies stress the importance of basis and the use of basis patterns for hedging decisions, they are not direct indicators of hedging returns in Iowa since returns for various marketing alternatives depend on local conditions.

The Central and North Central Iowa studies provide basis patterns and an analysis of hedging opportunities that are relevant in their respective districts. However, they do not include analyses of new-crop pricing alternatives during the summer or discussions of potential impacts of the Chicago basis on local market conditions.

Method of Presentation

The thesis will include in order: (1) definitions and explanations of terms relevant to this analysis; (2) an outline of theoretical cash-futures price relationships over space; (3) an in-depth analysis of Chicago basis patterns and their possible effects on local basis figures; (4) an outline of theoretical cash-futures price relationships over time and a comparison of returns from storage hedges and unhedged storage; (5) new-crop pricing results including pre-harvest hedging and forward contracting; and (6) concluding remarks summarizing available marketing alternatives and the potential returns from each during the 1974 through 1979 period.

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[1]See Arthur B. Sogn, "Farmers Use of Grain Futures," South Dakota Agricultural Experiment Station Bulletin 590, November 1971; Steve A. Callahan, "Grain Merchandising and Futures Markets in Kentucky," Kentucky Cooperative Extension Service Series No. 7, March 1972; and T. A. Hieronymus, "When to Sell Corn, Soybeans, Oats, and Wheat," Illinois Cooperative Extension Service, Circular 833, October 1966.

CHAPTER II. EXPLANATION OF HEDGING, CONTRACTING, AND OTHER MARKETING PROCEDURES

Before analyzing corn and soybean marketing alternatives, an understanding of the terms and methods relevant to the decision process is necessary. Important terms and marketing procedures used in this report are explained and defined in the sections that follow.

Futures Trading

Futures trading involves the buying and selling of standardized contracts for future delivery of a specified commodity.[1] These instruments are legal contracts, enforceable by the rules of the exchanges on which they are traded, to deliver or accept delivery of a definite amount of a commodity during a specified month at a specified price.[2] Locations at which delivery may be made also are specified by the futures contracts.

The two major exchanges which provide futures contracts for corn and soybeans are the Chicago Board of Trade (CBOT) and the Mid-America Exchange (MAE), both located in Chicago. A comparison of futures contracts for these commodities on the two exchanges reveals only two main differences. First, the CBOT contracts are traded in 5,000 bushel increments while the MAE trades in 1,000 bushel increments. Secondly, CBOT high and low prices are published for each day's trading,

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[1]William G. Tomek and Kenneth L. Robinson, Agricultural Product Prices (Ithaca: Cornell University Press, 1972), p. 234.

[2]Ibid.

while only closing prices on MAE are published.

A futures contract as defined here calls for the delivery or acceptance of a specific grade of a commodity at a specified future time and at a specific location or locations. For example, it is possible to deliver No. 2 yellow corn at approved warehouses in Chicago, St. Louis, or Toledo, Ohio, or No. 2 yellow soybeans at Chicago and Toledo to fulfill a Chicago Board of Trade contract. If the grain being delivered is not of the same grade as specified in the contract, substitute grades may be delivered at fixed discounts or premiums. For example, No. 1 yellow corn can be delivered on futures contracts at a 1/2 cent per bushel premium while No. 3 yellow with a 15.5 percent moisture maximum is acceptable at a 2 1/2 cent discount. In soybean futures, premiums and discounts of three cents and two cents per bushel respectively have been applied in recent years for delivery of No. 1 yellow and No. 3 yellow grades, provided the latter grade contains 14 percent moisture or less.

The futures trader is responsible to a futures clearing house for any decline in the value of his futures contract. His net position is cancelled when the trader offsets his original position through another futures trade in the same contract delivery month. For example, a purchase would offset a previous futures contract sale.

It should also be noted that delivery on futures contracts is at the seller's option. This means the seller is the one who decides whether to make delivery on his contract. Delivery can be made at anytime during the delivery month, and the seller also must make the decision of where delivery will be made. If a notice to deliver is given, the clearing house then notifies a trader with a net long (or purchased) position that he is scheduled to receive delivery. The trader receiving such a notice has two alternatives; he may sell his contract and pass the notice to another trader or accept delivery of the grain. Alternatively, he may decide to take delivery, then sell the commodity in the cash market. Delivery notices are allocated to long traders by age of outstanding positions, with the oldest longs receiving the first delivery notices.

Futures traders can be categorized as hedgers and speculators. Hedgers are traders who use futures contracts as a temporary substitute for a later transaction in the cash market.[1] Their main motive for trading in futures contracts is to protect profit margins from the risk of price changes. A selling hedge by cash grain producers would begin with the sale of a futures contract. A grain buying hedge, useful to livestock feeders and grain exporters, is initiated with a purchase of a contract.

Speculators trade in the futures market with the expectation of making a profit from price changes.[2] They typically do not use their positions as substitutes for cash transactions. Speculators can be subdivided into three general categories. Scalpers are speculators

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[1]Holbrook Working, "Hedging Reconsidered," Journal of Farm Economics 35, No. 4 (November 1953): p. 553.

[2]Tomek and Robinson, Agricultural Product Prices, p. 236.

who trade frequently on small price changes.[1] Their profits and losses result from minute-to-minute or day-to-day trends. Scalpers are not long-term position holders. A second type of speculator, the position trader tends to take a position in the market with expectations of profiting from longer term price movements.[2] For example, if this type of trader expects the price of a specific contract to rise, he will buy the contract hoping to sell it at a higher price at a later time. A third type of speculator is the spreader. Spreaders simultaneously purchase one futures contract month and sell contracts calling for delivery at a different time, often with the same commodity.[3] They do this because they believe that the difference or spread between the two futures contract prices is unusually large or small and represents an opportunity to profit from changing price relationships. If the expected change actually occurs, the spreader will make a profit when his initial transactions are offset.

Basis

In analyzing and choosing among marketing alternatives, an important concept is the local grain basis. Basis can be defined as the difference between the local cash price and the price of a specific futures contract.[4] The basis can vary substantially from

[1] Ibid.

[2] Ibid.

[3] Ibid.

[4] Ibid., p. 240.

area to area.

For example, if May soybean futures contracts at the Chicago Board of Trade are trading at \$6.75 per bushel and the cash price at a Southeast Iowa elevator is \$6.20, the local basis is \$.55 under May.

Note that basis can be either positive or negative. If the basis is negative as in the preceding example, the local cash price is below the futures market price and the basis is stated in cents under futures. In the case of a positive basis, the opposite occurs. For example, if the basis is +\$.40, this denotes the local cash price is \$.40 above the futures contract price. Basis behavior will be used here to analyze and evaluate the various marketing alternatives available to cash grain producers.

Hedging

Hedging can be defined as the practice of buying or selling futures contracts to offset an existing position in the cash market.[1] This procedure is designed to protect the producer against any unforeseen major movement in price. For example, if a producer owns inventory of a commodity and is faced with a possible decline in market price, he may hedge to reduce price risk. This would be accomplished by selling contracts in the futures market in a volume equal to the physical commodity inventory.

Hedging is based on the assumption that cash and futures prices rise and decline together. This leaves the hedger in a position where

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[1]Ibid., p. 236.

losses or gains resulting from unforeseen cash market changes will be offset by approximately equal and offsetting gains or losses from his futures position.[1] In the example above, if prices decline, losses that occur from the cash holdings will be about offset by gains resulting from the futures sale.

This example assumes gains and losses from cash and futures transactions will about offset each other. While this is theoretically correct, the following conditions usually prevent actual equality of gains and losses from occurring:[2]

(1) Because of basis changes, exact parallel price rises and declines in the two markets seldom occur.

(2) Brokerage charges and margin costs have to be paid on hedging transactions in commodity futures.

(3) Quality, delivery conditions, and payment terms of commodity futures contracts can be appreciably different from those applicable to the cash commodity being hedged.

It is important to note that hedging does not guarantee a profit will occur or that a loss will be avoided. Other influences on net returns include possible spoilage or shrinkage of the commodity, changes in transportation costs, and handling and storage costs.

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[1] G. Wright Hoffman, Future Trading Upon Organized Commodity Markets in the United States (Philadelphia: University of Pennsylvania Press, 1932), pp. 381-82.

[2] Henry B. Arthur, Commodity Futures as a Business Management Tool (Boston: Harvard University, 1971), p. 52.

However, hedging can protect the producer or other businesses against major unforeseen movements in price.

Preharvest hedge

A preharvest hedge can be accomplished by selling futures contracts during the growing season.[1] As the producer harvests his crops he then simultaneously sells his cash crop and buys back his futures commitment. Through a preharvest hedge, the producer establishes a price that will be received at harvest and protects himself against unforeseen major price movements that may occur during or before harvest.

In deciding whether to use a preharvest hedge, the producer should first estimate the local price to be received from the hedging transaction. As an example of how this would be done, suppose that in early June of the growing season the December corn futures contract is selling for \$2.80 per bushel. To localize the futures price, two items would be deducted as shown below:

December futures price in early June		\$2.80/bushel
Minus: Normal basis at harvest	.50	
Brokerage and interest on margin deposit	.02	
Total		-.52
Target price at the local level		\$2.28

Note that the basis is the largest deduction in the above example. Information on probable harvest basis figures can be calculated from local price records for the past few years. The cost of future

[1] Robert N. Wisner, "Using Grain Futures in the Farm Business," Iowa State Cooperative Extension Service, Pm-687, March 1976, pp. 5-6.

trading listed in the previous example includes commission charges to a broker, and interest income foregone by depositing money in a margin account with the broker. Margin deposits typically range from 5 to 15 percent of the total value of the contracts. The purpose of the margin deposit is to provide protection against default by the trader. Additional margin deposits may be required with adverse price movements (e.g., a price rise for the seller). Such deposits are known as margin calls. However, if the price declines for the seller he may at his option withdraw the profits from futures trading which have accumulated in his margin account.

In the example above with a perfect hedge, assuming the $.50 basis actually occurs at harvest, a producer would receive $2.28 per bushel for his hedged crop. The December futures contract that was sold for $2.80 in June would be cancelled by buying back the futures commitment at a price $.50 above the cash price. For this reason, the $.50 and the $.02 brokerage and margin costs are deducted from the original futures contract sale and a projected price of $2.28 results.

In deciding whether to hedge, the producer should consider his expectations of the cash prices that will be received at harvest. If he believes the harvest price will be below $2.28 he should consider hedging a portion of the crop. It is important that the producer not hedge all of his expected production early in the growing season, since his actual production may be less than expected. In addition, it should be noted that he can only sell futures in 1,000 or 5,000 bushel increments. As the growing season ensues, he can better estimate the yield to be expected and may wish to increase the size of his hedge by selling additional contracts.

Storage hedge

A storage hedge is accomplished by selling futures contracts at harvest and storing the cash crop until some later date, usually late spring of the following year when the basis historically narrows. At that time the hedger would simultaneously sell his cash crop and buy back futures contracts.[1] A storage hedge in the July futures contract would allow the producer to earn storage income while providing price protection.

In deciding whether to establish a storage hedge, the producer should first estimate the expected storage returns from the hedging transaction. The return for storage can be calculated as follows:[2]

$$R = B_B - B_E - HC$$

where

R = return to storage

B_B = beginning basis

B_E = expected ending basis

HC = expected hedging costs

Assuming that the July futures basis in November is \$.90 under, that the ending basis is expected to be \$.50 under in early June and

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[1]Ibid., pp. 6-8.

[2]Formula received from Dr. Ronald Raikes, Professor of Economics, Iowa State University, Winter quarter classnotes, 1979.

expected hedging costs are $.02, the gross return for storage would be $.38. To determine if hedging is profitable, a comparison between this return and the actual costs of storage should be made. If the actual costs are less than $.38, the storage hedge offers a potential profit. If storage costs exceed $.38, expected net returns from a storage hedge would be negative.

Note that the return for storage is the change in basis from the time the storage hedge is placed until the time it is lifted minus hedging costs. The following example illustrates how the change in basis equals the return for storage. In this example, futures prices decreased by $.35 per bushel, giving a 35 cent return on futures transactions, whereas cash prices rose by $.10 per bushel giving a 10 cent return on the cash transactions. The combined return (i.e., $.45 per bushel) from the futures and cash transactions equals the basis at the time the storage hedge was placed minus the basis when the hedge was lifted (i.e., $.85 - .40 = $.45).

Futures market	Cash market	Basis
Placement of storage hedge:		
Oct. 1 - Sell July futures @ $2.95	Buy cash @ $2.10	$.85
Lifting the hedge:		
June 15 - Buy July futures @ $2.60	Sell cash @ $2.20	$.40
Return from futures $.35	from cash $.10	Total $.45

The producer should next consider which direction prices are likely to move from the time the hedge is placed until the time the hedge is lifted. If the expected return to the producer from not hedging is greater than from hedging, he should consider storing his grain and selling it at a later date without using the futures market. The producer's ability to absorb financial risks from a decline in cash prices should also be considered in the hedging decision.

Cash Sale

A cash sale is the act of delivering grain to the local elevator and receiving the cash price quoted for immediate delivery. Traditionally, this has been the typical method used by Iowa corn and soybean producers to market their crops. Cash sales have the advantage that little or no technical knowledge is required for their use.

Forward Contracting

Forward contracting occurs when a producer enters into a written agreement locking in a specific price for delivery of a specified quantity of product to a local elevator or processor at a specified time such as during the harvest season.[1] For example, let's suppose that in April a producer received a bid from an elevator of $6.95 per bushel for soybeans to be delivered in November. If the producer expects prices to decline between April and November, he may wish to

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[1]Arthur B. Sogn and Richard K. Rudel, eds., "Marketing Alternatives for Producers of Wheat," Agricultural Information Office, South Dakota State University, Brookings, South Dakota, 1973, p. 13.

enter into this type of contract. If on the other hand, he expects prices to rise, the producer may decide not to forward contract.

Assume the producer enters into a forward contract with a local elevator at this price. He now is obligated to deliver a designated quantity of soybeans in November. As with preharvest hedging, it is generally advisable that the producer not forward contract all of his expected production because of uncertain yield prospects.

Forward contracting at times may have price advantages over cash sales, along with the primary disadvantage that it does not protect against uncertain yields. When the producer enters into a forward contract he knows the price he will receive. If the contracted price allows a profit and the producer is not able or willing to risk lower prices, such a contract can be a useful marketing alternative. Forward contracts allow a smaller producer to sell in quantities more closely matching his production than might be available through hedging in the futures market. If a preharvest hedge were used, the futures contracts can be traded only in 1,000 or 5,000 bushel increments. A forward contract also may help to guarantee the producer an outlet for his grain if storage space is lacking. In years with serious transportation problems, some elevators have been reluctant to purchase grain at harvest until they are assured of transportation services. However, if the grain was purchased earlier on contracts, such grain is likely to be accepted for delivery at harvest.

Deferred Pricing Contracts

Deferred pricing or price later contracts and basis contracts are marketing alternatives initiated for the purpose of dealing with possible grain handling and transportation problems.[1] Price later contracts allow a producer to deliver grain to the elevator at harvest, but delay pricing until later in the season. Once the contract is negotiated, title to the grain is transferred from the producer to the elevator, thus permitting the elevator to use its facilities more efficiently by shipping the grain when transportation equipment is available.

Basis contracts are written agreements specifying that the grain is to be priced at a predetermined discount from the price for a given futures contract delivery month. The two parties to the contract agree on the futures contract month to be used, and the seller is allowed to choose any trading day to price the grain up to the deadline specified within the contract.

For example, if a $.60 basis under the May futures was used, the producer would be able to select his price simply by subtracting $.60 from the quoted May futures price on the day of his choice. The $.60 basis would be deducted to cover all storage, shrinkage, and transportation costs incurred by the elevator. As with price later contracts, title to the grain is transferred to the elevator at the

[1]Robert N. Wisner, C. Phillip Baumel, and John A. Wallize, "New Way to Sell Corn: How It Worked," Wallaces Farmer 100, No. 7 (April 12, 1975):76-77.

time it is delivered. Thus, the grain can be shipped out when availability of transportation equipment permits.

With price later contracts, the producer is permitted to price his grain using the regular posted bid at the elevator instead of the futures price minus a basis deduction. If the producer uses this alternative, he typically agrees to pay a daily or monthly service charge which would be approximately comparable to elevator storage charges. The producer usually has no other costs in these alternatives except interest income foregone until the grain is priced and full payment is received. However, in some basis contracts the seller's price is reduced by the amount of any increase in freight rates that occurs between the date the contract is initiated and the date the grain is priced. Also, a cash advance is sometimes made on basis and price later contracts. This would result in a savings on interest costs on the seller's grain marketing.

When deciding whether to use delayed pricing or store grain at the elevator, the producer should consider the contract basis or service charge, likely future basis charges, storage costs, and expected future price trends.

The next chapter deals with the various factors effecting basis (price relationships between the cash and futures markets). An understanding of these relationships is important in evaluating contracting and hedging alternatives available to cash grain producers.

CHAPTER III. THEORETICAL AND ACTUAL RELATIONSHIPS BETWEEN CASH AND FUTURES PRICES

The relationship between cash and futures prices determines the price that will be obtained through hedging. Hedging returns also can be used as a benchmark in evaluating forward contracting alternatives as well as cash prices and storage returns.

Two basic price relationships exist between the cash and futures markets; the relationship over time (intertemporal) and over space (spatial).

Spatial Price Relationships

Many agricultural commodities reflect areas of surplus and deficit supplies. Processors, exporters, and other users seek to purchase in areas of surplus supplies where costs are lowest, for resale in locations where the crop is more valuable. Incentive for movement from one area to another is accomplished through a pricing mechanism taking into account transfer costs. These costs include loading, handling and transportation costs.[1]

In the case of corn and soybeans, Chicago is the par delivery point for corn and soybean futures contracts, and prices in the six reporting districts of Iowa are influenced by the transfer costs between Chicago and each reporting district. Because of this, grain prices may differ substantially from one district to another,

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[1] Thomas A. Hieronymus, Economics of Futures Trading (New York: Commodity Research Bureau, Inc. 1971), pp. 167-68.

depending on relative distances from Chicago.

Price differences among areas should not be expected to exceed transfer cost differences to major markets for any length of time if transportation services are readily available. The reasoning for this is that price differences exceeding these costs would provide incentives to transfer the commodity from the outlying districts to major markets. This movement would continue until transferring of the commodity is no longer profitable, that is, until the price difference between the markets no longer exceeds transfer costs.

Futures delivery costs and spatial price relationships

For similar reasons, differences between local cash prices and expiring grain futures prices should not be expected to exceed costs of delivering on futures contracts if transportation services are readily available. For example, if the price for the expiring corn futures contract is $2.65 per bushel and transfer costs are $.70 per bushel from Northwest Iowa to Chicago, then the cash price within this district at futures contract maturity should not be expected to drop below $1.95. Otherwise, an incentive would exist to purchase corn locally, sell futures contracts and deliver on the futures market. The commodity would be transferred from Northwest Iowa to Chicago until the incentive for delivery disappears. However, it should also be noted that Northwest Iowa relies heavily on rail transportation for movement of its crops. If rail transportation problems or inadequate supplies of transportation equipment occur in this region, price differences could exceed delivery costs. The same potential would exist if impediments to delivery were to occur at futures delivery points.

One of the objectives of this thesis is to compare the actual corn and soybean basis in the expiring contract month with the corresponding delivery cost basis. This comparison will indicate whether delivery costs set a maximum limit on the local basis and will determine whether incentives for delivery of Iowa corn and soybeans on futures markets have occurred in recent years. These results will be discussed in detail later in this chapter.

If a producer or grain elevator manager decides to deliver on a futures contract, he is responsible for all costs of delivery. The delivery process involves placing grain under warehouse receipt at approved delivery elevators and paying for costs of obtaining a warehouse receipt. Inspection and grading as required by CBOT and MAE, storage until title is transferred to the contract buyer, insurance, and interest on inventory until payment is received are a part of the delivery cost. Thus, costs of delivering on futures contracts include transportation costs, weighing, inspection, and grading at the destination, storage, insurance, and interest on the commodity as well as a merchandising margin received by the country elevator to cover its costs.

Transportation costs make up a large portion of the total delivery costs and will vary depending upon the type of transportation used. For example, rail transportation rates are available for single car or multicar shipments, with the rates decreasing as more cars are used per shipment. Rail rates also are classified as domestic or export. To deliver on Chicago grain futures contracts, a domestic rate that provides transit billing is needed.[1] Transit billing provides for shipments to Chicago with an option of moving the grain from Chicago to other locations for processing, grading, or other activities. The export rate is used for shipments to Chicago for export only. Export rates are lower than those for domestic shipments.

Two types of domestic rail rates are available from Chicago to other destinations. These types are classified as flat and proportional rates. The flat rate is used when the crop is shipped from Chicago directly to a specified location whereas the proportional rate permits grain to be shipped to processing plants or to have grading or other activities performed along the way, with the end products shipped on to other locations. If futures contract obligations are filled by truck delivery, the difference between the flat and proportional rail rates from Chicago to New York is used to determine the value of transit billing. This is added as an extra cost of delivery to be paid by the seller. It permits the buyer who takes delivery to move the grain out of Chicago to a location of his choice at the same cost as if it had moved into Chicago under a transit rail rate.[2]

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[1]Remember that the domestic rate allows the trader who is accepting the delivery of grain to move it from Chicago to other locations, whereas the export rate does not allow this movement. For the rules associated with delivery, see Rules and Regulations, Board of Trade of the City of Chicago (Chicago: Chicago Board of Trade, September 1, 1977), pp. 111-17; and MidAmerica Commodity Exchange Rules (Chicago: Mid-American Commodity Exchange, May 1976), Chapter 5, pp. 1-6.

[2]Conversation with Frank Polem, Chicago Board of Trade Transportation Specialist, Chicago, 21 August 1979.

As previously mentioned, three representative locations were chosen within the Northwest and Southeast Iowa price reporting districts for use in determining the delivery cost basis. These locations were selected to provide potential shipping services from a major portion of each district. Adequate elevator capacities and transportation services by at least two railroad lines also were used as general criteria. For the purpose of this analysis, the delivery costs from the three locations were averaged to obtain a single delivery cost basis for each district.

Rail transportation rates, as with most other costs, have increased throughout the 1974-79 period as a result of rising fuel, labor, and equipment costs. For example, average Northwest Iowa domestic corn rail rates to Chicago during the 1974 through 1979 period increased from 24.5 to 47.7 cents per bushel. Soybean rates during this same period increased from 28.5 to 59.7 cents per bushel. The same analysis for Southeast Iowa shows an increase of 16.9 to 33.5 and 21.2 to 42.5 cents per bushel for corn and soybean delivery, respectively. Note that Southeast Iowa rail rates were eight to seventeen cents less than the corresponding rates from Northwest Iowa. This difference can be attributed to the difference in distances from the locations within each district to Chicago.

Trucks may also be used to deliver grain on a futures contract; as with rail freight, these rates have increased substantially during the 1974-79 period because of inflation in major cost components. Truck rates were obtained from personal communications with trucking firms and were designated as mid-year rates. Industry sources noted that truck rates vary considerably with market conditions and back haul availability since rates for agricultural products are unregulated. However, they indicated these rates are believed to be typical for the time periods considered here. Truck rates from Northwest and Southeast Iowa to Chicago were the same for the first five years of the study, 27 to 30 cents per bushel, and during the last year Southeast Iowa held a 7.5 to 10 cents per bushel advantage over Northwest Iowa rates. This advantage is probably explained in part by demand conditions and back haul situations.

Which futures delivery points are appropriate for Iowa grain?

If a producer or grain elevator operator should decide to deliver on a CBOT or MAE corn futures contract, he has the option of delivering to one of three different delivery areas: Chicago, St. Louis, or Toledo, Ohio. On soybean contracts, he could only deliver to Chicago until September 1979, when Toledo, Ohio was added as a soybean delivery point. Because of the greater distance from Iowa, Toledo does not appear feasible as a point for delivery of Iowa grain under normal conditions and thus will not be included in this analysis.

If a hedger delivers to St. Louis, there is a four cents per bushel discount from the corn futures contract price. For example, if the CBOT futures quote on the day of delivery is $2.70, the deliverer of grain will receive $2.66 at St. Louis.

Another point which may have a bearing on the ability to deliver is the amount of approved storage available at delivery points. There are

47,285,000 bushels of capacity available in Chicago and 17,005,000 bushels at St. Louis in grain warehouses which are authorized to accept delivery to fulfill futures contracts. The authorized warehouses in Chicago are: Cargill, Incorporated; Continental Grain Company; Indiana Farm Bureau Cooperative Association, Incorporated; and General Mills, Incorporated. In St. Louis, delivery may be made to: St. Louis Grain Corporation; Peavey Company; or Continental Grain Company.[1] However, it should be noted that these warehouses are privately owned and are not obligated to receive grain on a futures contract. Thus, it is essential that a hedger confirm space in one of the warehouses before attempting to make delivery. In most cases, these uncertainties and potential transportation problems make it desirable to close out hedges by offsetting the original futures position rather than through delivery. However, an effective delivery mechanism is important to the operation of grain futures markets. Only if delivery is possible or the threat of delivery is effective, would one expect the delivery costs to set the maximum differential between local cash prices and expiring futures contract prices.

In comparing transportation costs to Chicago and St. Louis from Southeast Iowa, it was found that both truck and rail rates to Chicago for 1979 were less than to St. Louis. Truck rates to Chicago are less because transportation firms are relatively sure that they can haul

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[1]Exact warehouse capacities of individual companies may be obtained from the Chicago office of the Commodity Futures Trading Commission.

back a full load from Chicago, whereas this is not the case with St. Louis.[1] The rail rates from Southeast Iowa to Chicago for the last quarter of 1979 ranged from 30.5 to 36.4 cents per bushel, whereas rail rates to St. Louis ranged from 49.3 to 56.0 cents per bushel.[2] Thus, rail shipments to St. Louis also would be more expensive than for Chicago delivery.

Trade sources indicate truck rates for the last quarter of 1979 from Southeast Iowa to Chicago and St. Louis were approximately the same at 32.5 cents per bushel. However, when the four cent per bushel discount for a nonpar delivery point is taken into account it made delivery to St. Louis a higher cost alternative than Chicago delivery.

Truck rates from Northwest Iowa to Chicago and St. Louis in late 1979 were not identical. Northwest Iowa rates were about ten cents per bushel higher for delivery to St. Louis than to Chicago. These higher transportation costs in addition to the four cent per bushel discount on delivery tends to eliminate St. Louis delivery from the two Iowa districts as a viable alternative. Thus, the attention here was focused on the delivery costs to Chicago.

To determine whether delivery costs actually set a lower limit on basis, total delivery costs were compiled for both the Northwest and Southeast price reporting districts. These costs are shown in

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[1] Conversation with James Zigring, Umthun Trucking Company Billing Officer, Eagle Grove, Iowa, 6 March 1980.

[2] Conversation with Al Birkibine, Iowa Department of Transportation Rail Transportation Specialist, Des Moines, 11 March 1980.

Tables 3-1 through 3-4 and Appendix Tables A-1 through A-4. Total rail delivery costs are comprised of five components: single-car freight rates, elevator charges at the delivery point, storage and insurance, interest costs, and the country elevator's merchandising margin. The largest single item is the rail transportation cost, discussed previously. The elevator charges consist of weighing, grading, elevation, and inspection at the delivery point. These costs are incurred in obtaining a warehouse receipt for the grain, as required by CBOT or MAE regulations.[1] Storage, insurance, and interest costs are incurred until title to the grain is passed to the person or firm who bought the futures contract. The last component is the country elevator's merchandising margin. This is an assumed margin incurred by the person or firm making delivery to cover the operating costs at the country elevator. The actual margins will vary from time to time and from one area to another, depending on market conditions.

Three conclusions are immediately noticeable from Tables 3-1 through 3-4: (1) delivery costs have increased substantially in the three year period from 1977 through 1979; (2) delivery costs are lower in Southeast Iowa than in Northwest Iowa; and (3) the cost differential between the two districts has widened significantly during the past three years. The rail delivery cost basis has increased from 29 to 44 percent during the three years ending 1979, with the exact increase varying between districts and crops, depending on the initial freight

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[1]Rules and Regulations Board of Trade of the City of Chicago, pp. 111-17; and MidAmerica Commodity Exchange Rules, Chapter 5, pp. 1-6.

Table 3-1. Estimated costs for delivery of corn and soybeans by rail from Northwest Iowa to approved futures delivery elevators in Chicago, 1977-79 in cents per bushel

	Corn						
Origin	Time interval	Single car[a]	Elevator charges[b]	Storage and insur.[b]	Interest on crop	Merchandising margin[c]	Total costs
Denison	1-07-77	32.20	5.0	0.4	0.8	6.0	44.40
Sioux City	to	40.88	5.0	0.4	0.8	6.0	53.08
Spencer	2-21-78	31.64	5.0	0.4	0.8	6.0	43.64
Denison	2-22-78	33.88	5.0	0.4	0.7	7.0	46.98
Sioux City	to	42.84	5.0	0.4	0.7	7.0	55.94
Spencer	8-20-78	33.32	5.0	0.4	0.7	7.0	46.42
Denison	8-21-78	35.28	6.0	0.5	0.8	8.0	50.58
Sioux City	to	44.52	6.0	0.5	0.8	8.0	59.82
Spencer	12-14-78	34.72	6.0	0.5	0.8	8.0	50.02
Denison	12-15-78	38.36	6.0	0.5	0.8	10.0	55.66
Sioux City	to	48.44	6.0	0.5	0.8	10.0	65.74
Spencer	2-24-79	37.80	6.0	0.5	0.8	10.0	55.10
Denison	2-25-79	38.92	6.0	0.5	0.8	11.0	57.22
Sioux City	to	49.00	6.0	0.5	0.8	11.0	67.30
Spencer	6-04-79	38.08	6.0	0.5	0.8	11.0	56.38
Denison	6-05-79	39.48	6.0	0.5	0.8	11.0	57.78
Sioux City	to	49.56	6.0	0.5	0.8	11.0	67.86
Spencer	7-27-79	38.64	6.0	0.5	0.8	11.0	56.94
Denison	7-28-79	40.42	6.0	0.5	0.8	11.0	58.72
Sioux City	to	50.74	6.0	0.5	0.8	11.0	69.04
Spencer	9-13-79	39.56	6.0	0.5	0.8	11.0	57.86
Denison	9-14-79	40.86	6.0	0.5	1.1	12.0	60.46
Sioux City	to	51.29	6.0	0.5	1.1	12.0	70.89
Spencer	10-14-79	39.99	6.0	0.5	1.1	12.0	59.59
Denison	10-15-79	44.24	6.0	0.5	1.1	12.0	63.84
Sioux City	to	55.71	6.0	0.5	1.1	12.0	75.31
Spencer	12-31-79	43.12	6.0	0.5	1.1	12.0	62.72

[a]Rail rates were obtained from Book of Grain Rates No. 16 West of the Mississippi. (Chicago: Chicago Board of Trade Transportation Dept., January 2, 1976, and updated.)

[b]Elevator and storage charges were obtained from personal communication with grain industry officials in Chicago.

[c]Merchandising margin is an assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and from one area to another, depending on market conditions.

Soybeans					
Single car[a]	Elevator charges[b]	Storage & insurance[b]	Interest on crop	Merchan-dising margin[c]	Total costs
43.80	5.0	0.4	2.8	9.0	61.00
43.80	5.0	0.4	2.8	9.0	61.00
43.80	5.0	0.4	2.8	9.0	61.00
45.90	5.0	0.4	2.7	10.0	64.00
45.90	5.0	0.4	2.7	10.0	64.00
45.90	5.0	0.4	2.7	10.0	64.00
47.70	6.0	0.5	2.3	11.0	67.50
47.70	6.0	0.5	2.3	11.0	67.50
47.70	6.0	0.5	2.3	11.0	67.50
51.90	6.0	0.5	2.3	13.0	73.70
51.90	6.0	0.5	2.3	13.0	73.70
51.90	6.0	0.5	2.3	13.0	73.70
52.50	6.0	0.5	2.5	14.0	75.50
52.50	6.0	0.5	2.5	14.0	75.50
52.50	6.0	0.5	2.5	14.0	75.50
53.10	6.0	0.5	2.5	14.0	76.10
53.10	6.0	0.5	2.5	14.0	76.10
53.10	6.0	0.5	2.5	14.0	76.10
54.36	6.0	0.5	2.5	14.0	77.36
54.36	6.0	0.5	2.5	14.0	77.36
54.36	6.0	0.5	2.5	14.0	77.36
55.57	6.0	0.5	2.9	15.0	79.97
55.57	6.0	0.5	2.9	15.0	79.97
55.57	6.0	0.5	2.9	15.0	79.97
59.69	6.0	0.5	2.9	15.0	84.09
59.69	6.0	0.5	2.9	15.0	84.09
59.69	6.0	0.5	2.9	15.0	84.09

Table 3-2. Estimated costs for delivery of corn and soybeans by rail from Southeast Iowa to approved futures delivery elevators in Chicago, 1977-79 in cents per bushel

	Corn						
Origin	Time interval	Single car[a]	Elevator charges[b]	Storage and insur.	Interest on crop	Merchandising margin[c]	Total costs
Burlington	1-07-77	26.32	5.0	0.4	0.8	6.0	38.52
Davenport	to	22.12	5.0	0.4	0.8	6.0	34.32
Washington	2-21-78	24.64	5.0	0.4	0.8	6.0	36.84
Burlington	2-22-78	27.72	5.0	0.4	0.7	7.0	40.82
Davenport	to	23.24	5.0	0.4	0.7	7.0	36.34
Washington	8-20-78	25.76	5.0	0.4	0.7	7.0	38.86
Burlington	8-21-78	28.84	6.0	0.5	0.8	8.0	44.14
Davenport	to	24.08	6.0	0.5	0.8	8.0	39.38
Washington	12-14-78	26.88	6.0	0.5	0.8	8.0	42.18
Burlington	12-15-78	31.36	6.0	0.5	0.8	10.0	48.66
Davenport	to	26.32	6.0	0.5	0.8	10.0	43.62
Washington	2-24-79	29.40	6.0	0.5	0.8	10.0	46.70
Burlington	2-25-79	31.64	6.0	0.5	0.8	11.0	49.94
Davenport	to	26.60	6.0	0.5	0.8	11.0	44.90
Washington	6-04-79	29.68	6.0	0.5	0.8	11.0	47.98
Burlington	6-05-79	31.96	6.0	0.5	0.8	11.0	50.26
Davenport	to	26.88	6.0	0.5	0.8	11.0	45.18
Washington	7-27-79	29.96	6.0	0.5	0.8	11.0	48.26
Burlington	7-28-79	32.11	6.0	0.5	0.8	11.0	50.41
Davenport	to	27.23	6.0	0.5	0.8	11.0	45.53
Washington	9-13-79	30.67	6.0	0.5	0.8	11.0	48.97
Burlington	9-14-79	33.03	6.0	0.5	1.1	12.0	52.63
Davenport	to	27.82	6.0	0.5	1.1	12.0	47.42
Washington	10-14-79	31.00	6.0	0.5	1.1	12.0	50.60
Burlington	10-15-79	36.40	6.0	0.5	1.1	12.0	56.00
Davenport	to	30.52	6.0	0.5	1.1	12.0	50.12
Washington	12-31-79	33.60	6.0	0.5	1.1	12.0	53.20

[a]Rail rates were obtained from Book of Grain Rates No. 16 West of the Mississippi. (Chicago: Chicago Board of Trade Transportation Dept., January 2, 1976, and updated.)

[b]Elevator and storage charges were obtained from personal communication with grain industry officials in Chicago.

[c]Merchandising margin is an assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and from one area to another, depending on market conditions.

Soybeans					
Single car[a]	Elevator charges[b]	Storage & insurance[b]	Interest on crop	Merchan-dising margin[c]	Total costs
31.80	5.0	0.4	2.8	9.0	49.00
27.00	5.0	0.4	2.8	9.0	44.20
33.90	5.0	0.4	2.8	9.0	51.10
33.30	5.0	0.4	2.7	10.0	51.40
28.50	5.0	0.4	2.7	10.0	46.60
35.70	5.0	0.4	2.7	10.0	53.80
34.50	6.0	0.5	2.3	11.0	54.30
29.70	6.0	0.5	2.3	11.0	49.50
37.20	6.0	0.5	2.3	11.0	57.00
37.50	6.0	0.5	2.3	13.0	59.30
32.40	6.0	0.5	2.3	13.0	54.20
40.50	6.0	0.5	2.3	13.0	62.30
38.10	6.0	0.5	2.5	14.0	61.10
32.70	6.0	0.5	2.5	14.0	55.70
40.80	6.0	0.5	2.5	14.0	63.80
38.70	6.0	0.5	2.5	14.0	61.70
33.00	6.0	0.5	2.5	14.0	56.00
41.40	6.0	0.5	2.5	14.0	64.40
38.44	6.0	0.5	2.5	14.0	61.44
32.86	6.0	0.5	2.5	14.0	55.86
42.39	6.0	0.5	2.5	14.0	65.39
40.05	6.0	0.5	2.9	15.0	63.05
34.15	6.0	0.5	2.9	15.0	57.15
42.84	6.0	0.5	2.9	15.0	65.84
43.80	6.0	0.5	2.9	15.0	68.20
37.50	6.0	0.5	2.9	15.0	61.90
46.20	6.0	0.5	2.9	15.0	70.60

Table 3-3. Estimated costs for delivery of corn and soybeans by truck from Northwest Iowa to approved futures delivery elevators in Chicago, 1977-79 in cents per bushel

		Corn						
Origin	Time interval	Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage and insur.[c]	Interest on crop	Merchandising margin[d]	Total costs
Denison	1-01-77	29.00	14.0	5.0	0.4	0.8	6.0	55.20
Sioux City	to	29.00	14.0	5.0	0.4	0.8	6.0	55.20
Spencer	2-21-78	29.00	14.0	5.0	0.4	0.8	6.0	55.20
All cities	2-22-78 to 8-20-78	29.00	15.0	5.0	0.4	0.7	7.0	57.10
All cities	8-21-78 to 12-14-78	30.00	15.0	6.0	0.5	0.8	8.0	60.30
All cities	12-15-78 to 2-24-79	30.00	17.0	6.0	0.5	0.8	10.0	64.30
All cities	2-25-79 to 9-13-79	40.00	18.0	6.0	0.5	0.8	11.0	76.30
All cities	9-14-79 to 12-31-79	40.00	20.0	6.0	0.5	1.1	12.0	79.60

[a]Transportation charges were obtained from private communication with trucking industry officials.

[b]Transit billing charges were calculated by taking the difference between the flat and proportional rail rates from Chicago to New York and were obtained through personal communication with Chicago Board of Trade officials.

[c]Elevator and storage charges were obtained from personal communication with grain industry officials in Chicago.

[d]Merchandising margin is an assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and from one area to another, depending on market conditions.

Soybeans						
Transportation[a]	Transit billing[b]	Elevator charges[b]	Storage & insurance[c]	Interest on crop	Merchandising margin[d]	Total costs
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	16.0	5.0	0.4	2.7	10.0	63.10
30.00	16.0	6.0	0.5	2.3	11.0	65.80
30.00	18.0	6.0	0.5	2.3	13.0	69.80
40.00	19.0	6.0	0.5	2.5	14.0	82.00
40.00	21.0	6.0	0.5	2.9	15.0	85.40

Table 3-4. Estimated costs for delivery of corn and soybeans by truck from Southeast Iowa to approved futures delivery elevators in Chicago, 1977-79 in cents per bushel

	Corn							
Origin	Time interval	Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage and insur.[c]	Interest on crop	Merchandising margin[d]	Total costs
Burlington	1-01-77	29.00	14.0	5.0	0.4	0.8	6.0	55.20
Davenport	to	29.00	14.0	5.0	0.4	0.8	6.0	55.20
Washington	2-21-78	29.00	14.0	5.0	0.4	0.8	6.0	55.20
All cities	2-22-78 to 8-20-78	29.00	15.0	5.0	0.4	0.7	7.0	57.10
All cities	8-21-78 to 12-14-78	30.00	15.0	6.0	0.5	0.8	8.0	60.30
All cities	12-15-78 to 2-24-79	30.00	17.0	6.0	0.5	0.8	10.0	64.30
All cities	2-25-79 to 9-13-79	30.00	18.0	6.0	0.5	0.8	11.0	66.30
All cities	9-14-79 to 12-31-79	32.50	20.0	6.0	0.5	1.1	12.0	72.10

[a]Transportation charges were obtained from private communication with trucking industry officials.

[b]Transit billing charges were calculated by taking the difference between the flat and proportional rail rates from Chicago to New York and were obtained through personal communication with Chicago Board of Trade officials.

[c]Elevator and storage charges were obtained from personal communication with grain industry officials in Chicago.

[d]Merchandising margin is an assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and from one area to another, depending on market conditions.

Soybeans						
Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage & insurance[c]	Interest on crop	Merchandising margin[d]	Total costs
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	15.0	5.0	0.4	2.8	9.0	61.20
29.00	16.0	5.0	0.4	2.7	10.0	63.10
30.00	16.0	6.0	0.5	2.3	11.0	65.80
30.00	18.0	6.0	0.5	2.3	13.0	69.80
30.00	19.0	6.0	0.5	2.5	14.0	72.00
32.50	21.0	6.0	0.5	2.9	15.0	77.90

rates. Rail freight rates increased nine times during the three year period.

Table 3-1 indicates the rail delivery cost basis for corn on July 1, 1979 averaged about 60 cents per bushel in Northwest Iowa. In other words, these costs suggest an incentive to deliver would have existed if Northwest Iowa cash corn prices received by the producers were lower than the 60 cent basis under the expiring futures contract during the final trading month. A wider basis could be expected prior to the delivery month, however. The rail delivery cost basis for soybeans in Northwest Iowa on July 1, 1979, averaged approximately 76 cents per bushel. In Southeast Iowa (see Table 3-2) rail delivery costs ranged from 48 cents per bushel for corn to 61 cents for soybeans.

Tables 3-3 and 3-4 indicate the truck delivery cost basis on July 1, 1979 averaged about 76 cents per bushel for corn and 82 cents for soybeans in Northwest Iowa. In Southeast Iowa (see Table 3-4) truck delivery costs ranged from approximately 66 cents per bushel for corn to 72 cents for soybeans.

Comparing the truck delivery costs to those for rail delivery, note that truck costs range from 6 to 18 cents per bushel higher than rail. For this reason, rail delivery expenses will be used for the delivery cost basis during the remainder of this analysis. Rail delivery would be a more economical delivery method than truck shipment.

Tables 3-5 and 3-6 show a comparison of the rail delivery cost

Table 3-5. Comparison of the delivery cost basis for corn and actual corn basis during months of futures contract expiration by Iowa Price Reporting Districts, 1974-79 in cents per bushel[a]

Year	March futures Delivery cost basis	March futures Actual basis	May futures Delivery cost basis	May futures Actual basis	July futures Delivery cost basis	July futures Actual basis	September futures Delivery cost basis	September futures Actual basis	December futures Delivery cost basis	December futures Actual basis
					Northwest Price Reporting District					
1974	34.5	--b	34.5	--b	37.8	--b	37.8	23.0	37.8	32.0
1975	38.8	24.0	40.7	7.7	42.3	22.7	42.3	33.0	43.1	17.7
1976	44.1	25.7	44.1	29.3	44.1	25.0	44.1	25.7	45.9	15.3
1977	48.4	22.7	48.4	24.3	48.4	27.3	48.4	43.7	48.4	33.7
1978	51.2	43.3	51.2	43.7	53.7	40.0	53.7	38.7	53.7	36.0
1979	59.5	42.3	59.5	48.0	60.1	57.3	63.1	57.3	67.5	55.0
					Southeast Price Reporting District					
1974	26.8	--b	26.8	--b	29.3	--b	29.2	13.2	29.2	26.0
1975	30.2	12.7	31.5	9.0	32.6	17.0	32.6	25.0	33.2	19.0
1976	34.2	12.0	34.2	15.7	34.2	22.0	34.2	27.7	35.7	16.3
1977	37.9	20.3	37.9	16.0	37.9	21.3	37.9	33.3	37.9	17.0
1978	40.1	27.7	40.1	20.3	42.1	26.0	42.1	22.3	42.1	18.0
1979	46.8	28.3	46.8	27.3	47.1	39.7	49.5	29.7	53.3	40.7

[a]Delivery cost basis is computed using rail delivery to Chicago as outlined previously in this report.

[b]Actual basis not available.

Table 3-6. Comparison of the delivery cost basis for soybeans and actual soybean basis during months of futures contract expiration by Iowa Price Reporting Districts, 1974-79, in cents per bushel[a]

Year	Jan. futures		Mar. futures		May futures		July futures		Aug. futures		Sept. futures		Nov. futures	
	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis	Delivery cost basis	Actual basis
	Northwest Price Reporting District													
1974	43.0	– b	44.2	– b	44.2	– b	48.1	– b	48.1	49.7	48.1	28.8	48.1	47.7
1975	49.1	31.0	49.1	28.7	51.3	30.0	53.0	45.0	53.0	39.0	53.0	40.3	54.0	36.0
1976	57.0	36.7	57.0	41.3	57.0	38.3	57.0	47.0	57.0	35.0	57.0	34.7	58.2	35.3
1977	62.0	38.3	62.0	48.7	64.1	46.0	64.1	23.3	64.1	43.3	64.1	31.7	64.1	41.2
1978	64.1	35.7	64.1	52.7	64.1	70.0	67.5	39.7	67.5	41.0	67.5	50.0	67.5	56.3
1979	72.7	44.0	74.5	64.3	74.5	45.7	77.1	56.7	78.4	47.3	78.4	38.7	85.1	67.3
	Southeast Price Reporting District													
1974	34.0	– b	34.6	– b	34.6	– b	37.6	– b	37.6	43.7	37.6	14.0	37.6	38.0
1975	38.6	26.0	38.6	13.3	40.1	14.0	41.5	22.0	41.5	19.0	41.5	25.0	42.3	33.7
1976	45.3	26.0	45.3	21.7	45.3	17.7	45.3	37.7	45.3	23.7	45.3	28.7	46.0	33.7
1977	49.1	32.0	49.1	31.3	50.7	29.3	50.7	22.7	50.7	31.3	50.7	21.7	50.7	27.0
1978	50.7	26.3	50.7	36.3	50.7	49.3	53.6	22.0	53.6	21.7	53.6	28.7	53.6	35.0
1979	57.6	29.3	59.2	41.7	59.2	28.3	61.7	32.3	61.9	25.7	61.9	14.7	67.9	61.7

[a]Delivery cost basis is computed using rail delivery to Chicago as outlined previously in this report.

[b]Actual basis not available.

basis and the actual basis under nearby futures during the final trading month in the period 1974 through 1979 for both the Northwest and Southeast Iowa price reporting districts. From this comparison note that: (1) at no time in either district did the average actual corn basis exceed the average delivery cost basis; and (2) only during the August and November futures in 1974 and the May futures in 1978 did the average actual soybean basis exceed the average delivery cost basis. If transportation problems contributed to the wide soybean basis at these times, one would expect a wide corn basis to occur also. Since the soybean basis widened without a similar effect on the corresponding corn basis, this suggests that possible impediments to delivery in Chicago may have contributed to the wide soybean basis.

These data indicate that in essentially all cases, there was no incentive for a hedger to deliver corn from Northwest and Southeast Iowa on futures contracts. However, on a few occasions, incentives for delivery of Iowa soybeans on futures contracts were indicated. From this analysis, it was concluded that delivery costs do set a lower limit on corn and in most cases on the Iowa soybean basis. Generally, the actual basis has run several cents less than the delivery cost basis.

This analysis suggests that the actual basis patterns should be used when localizing prices in the future rather than the delivery cost basis. The historical basis patterns over the six-year study period, after adjustments for inflation, represented a better tool for localizing futures prices than the costs of delivering on futures contracts.

Influence of Chicago Delivery Conditions on Iowa Basis

In addition to lack of transportation, impediments to delivery at the futures delivery points may also affect local basis patterns. If it is impossible, or extremely difficult to deliver grain on futures contracts, the district basis figures can exceed the corresponding delivery costs.

The unusually wide soybean basis in 1974 and 1978 suggests a need to analyze Chicago basis behavior for evidence of possible impediments to delivery. An analysis of Chicago basis patterns will be presented in Chapter 4.

CHAPTER IV. CHICAGO BASIS BEHAVIOR AT CONTRACT MATURITY

With the greater costs of delivery to St. Louis and Toledo, all deliveries on corn and soybean futures contracts from Iowa would logically be routed to Chicago under normal conditions. However, if serious transportation problems, grain handling difficulties, or lack of available storage space exist at Chicago elevators, this could prevent delivery of grain at that location to fulfill futures contracts. These conditions could cause a distorted relationship between cash and futures prices. In such cases, we would expect delivery on futures contracts to be made at St. Louis or Toledo, Ohio.

In the preceding chapter, the Iowa basis was compared to the delivery cost basis from both Northwest and Southeast Iowa to Chicago. These results indicate that delivery costs and the threat of delivery have been effective in setting the lower limit on the local corn basis. However, Iowa soybean basis patterns raise some doubt about the effectiveness of the threat of delivery in the soybean futures market. To enable the hedger to better understand delivery possibilities, the Chicago basis under expiring corn and soybean futures contracts was compiled for the last 25 days of trading before contract maturity. These results were compared to the costs of delivery on futures contracts at Chicago.

As a framework for analyzing the Chicago basis, it is hypothesized that if the following three conditions are evident, then there are no major impediments to delivery present. These conditions are as follows:[1]

(1) During the final month of trading before a particular futures contract expires, Chicago cash prices should differ from the price of the expiring futures contract for the same commodity by no more than the costs of delivery, except possibly for brief periods.

(2) Cash prices during the final trading month should be expected to range above and below expiring futures contract prices with about equal frequency.

(3) Variability of the Chicago basis against expiring futures contracts should gradually diminish during the final weeks of trading as the futures contract expiration date is reached.

If delivery is possible or the threat of delivery is effective, one would expect the Chicago basis to be relatively stable and predictable as contract maturity approaches. If futures prices are above Chicago cash prices, traders would bid down futures prices by selling futures while then simultaneously buying local cash grain to deliver on the futures contract. This action would continue with futures prices being bid down and cash prices being bid up until the two prices are approximately equal. If, however, futures prices are below Chicago cash prices, traders would bid up futures prices by buying futures and

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[1]Robert N. Wisner, Craig A. Chase and H. Alan Carver, "Analysis of Corn and Soybean Basis Patterns and Hedging Opportunities for Cash-Grain Producers by Price Reporting Districts in Iowa," report sponsored jointly by the Iowa Farm Bureau Federation and the Iowa Agricultural Experiment Station, Iowa State University, Ames, Iowa, May 1980.

holding them for delivery until cash and futures prices are approximately equal. If no impediments to delivery exist, one would expect cash prices above and below expiring futures quotations to occur with about equal frequency. The price differences between the two markets might be slightly larger four to six weeks prior to contract expiration, but with the difference smaller and less variable as contract maturity approaches.

In this analysis, Chicago cash prices were obtained from the Chicago Board of Trade annual statistical summaries[1] and the Grain Market News Branch of the U.S. Department of Agriculture. Futures prices were obtained from the Wall Street Journal and Iowa State University Market News office files.

Chicago Corn Basis

Figures 4-1 through 4-5 and Appendix Figures B-4 through B-8 show the Chicago hopper car basis for corn in relation to the March, May and July futures contracts during the last 25 days of trading for the period 1975 through 1979. It should be noted that prior to November 1974, only box car prices were published on Chicago corn. Examples of box car quotes are shown in Appendix Figures B-1 through B-3. This analysis is based only on hopper car cash prices, since box car bids reflect growing obsolescence of box cars as a method of transporting grain. The reason for this obsolescence is that additional labor is required for loading and unloading boxcars; also,

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[1] Statistical Annual Chicago Board of Trade (Chicago: Board of Trade of the City of Chicago, 1974 and 1975).

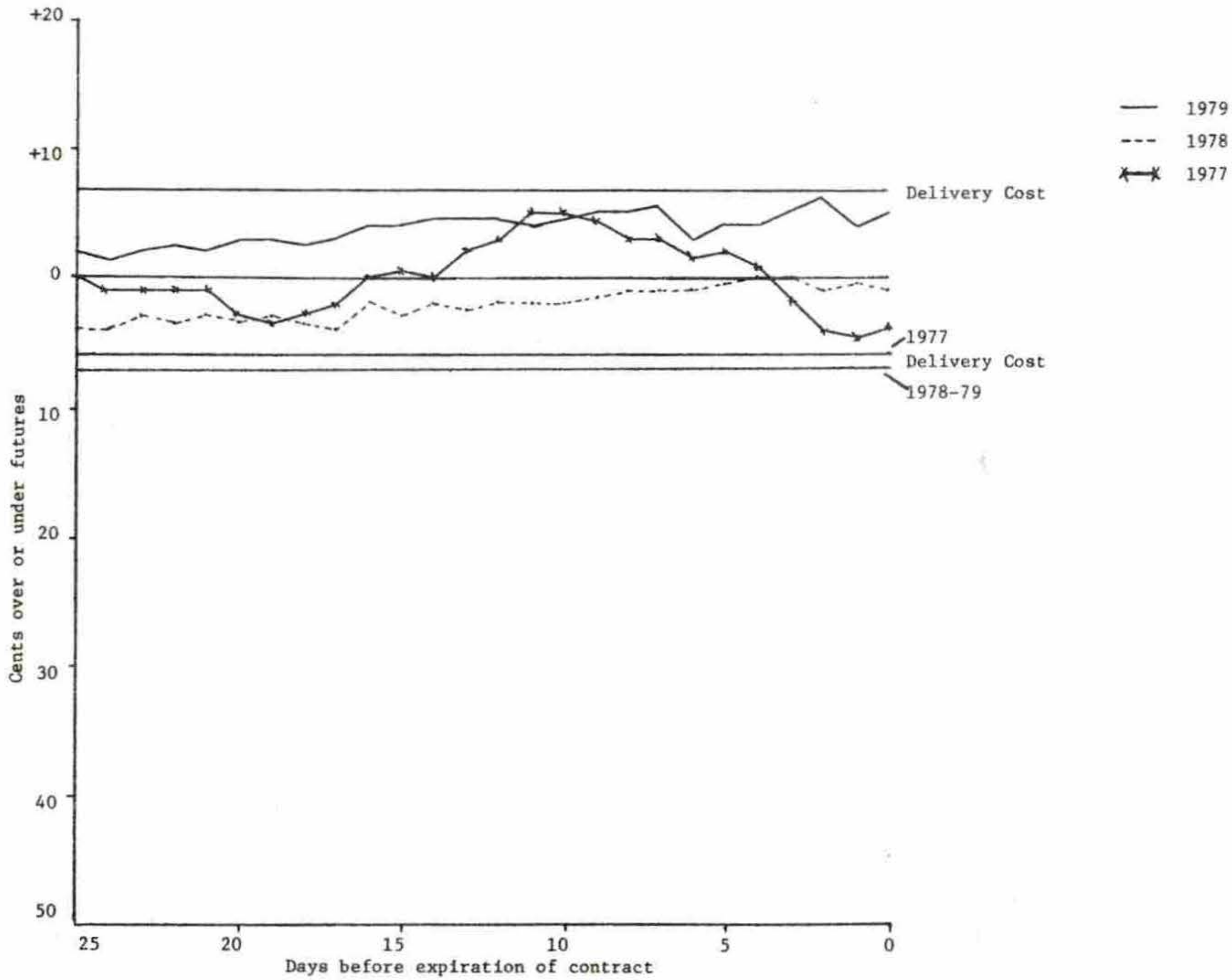

Figure 4-1. Chicago hopper car corn basis for the March futures, 25 days prior to expiration, 1977-79

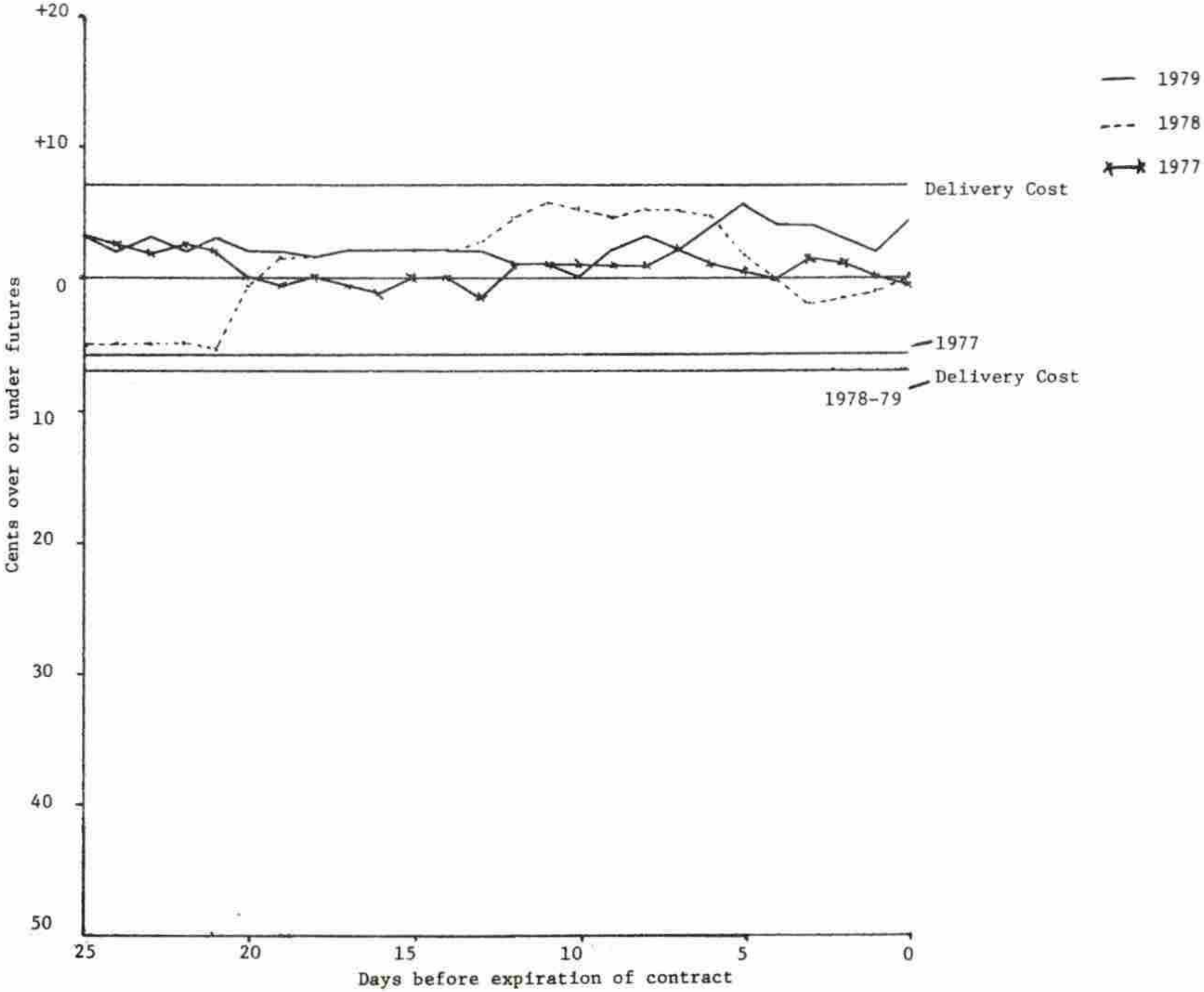

Figure 4-2. Chicago hopper car corn basis for the May futures, 25 days prior to expiration, 1977-79

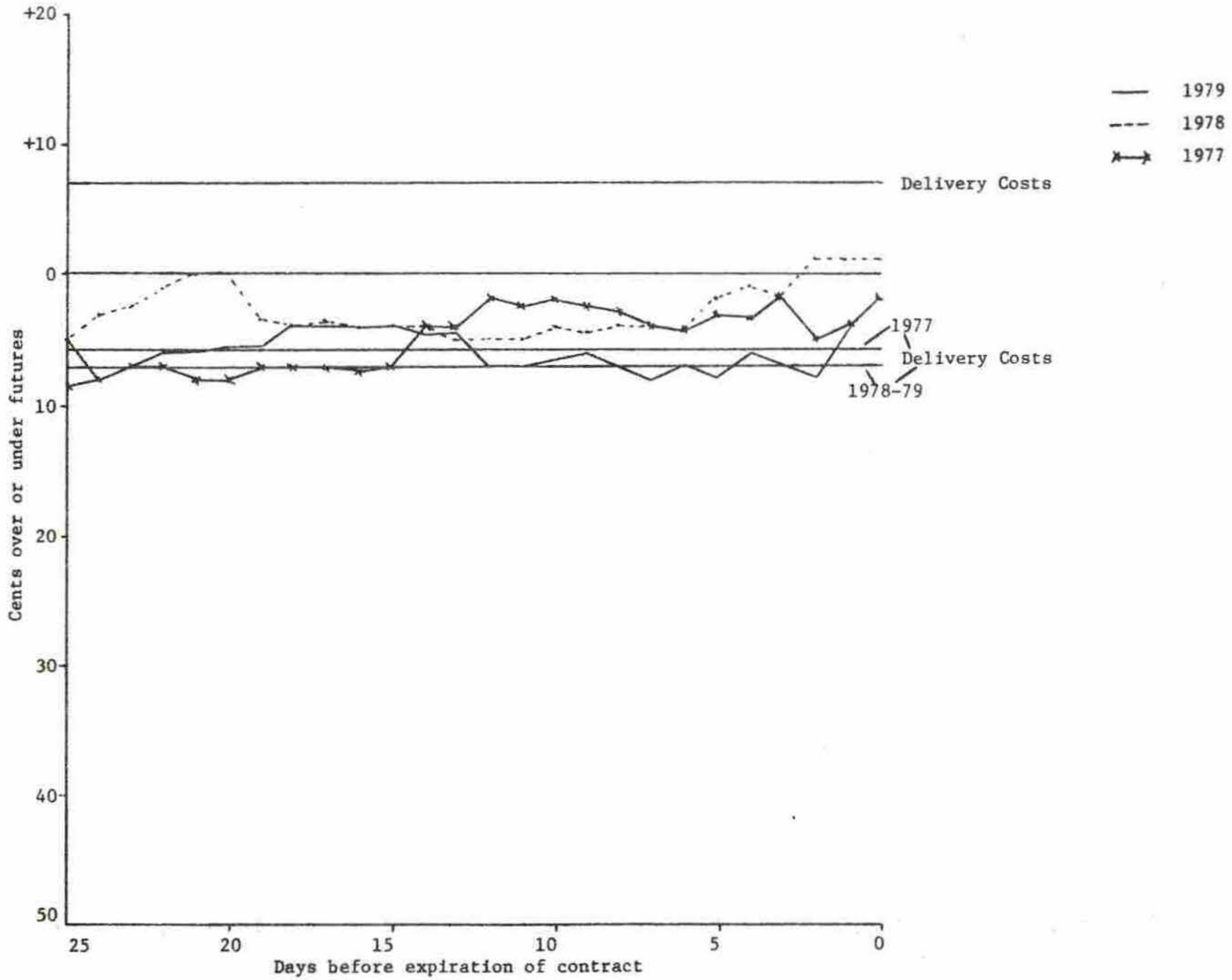

Figure 4-3. Chicago hopper car corn basis for the July futures, 25 days prior to expiration, 1977-79

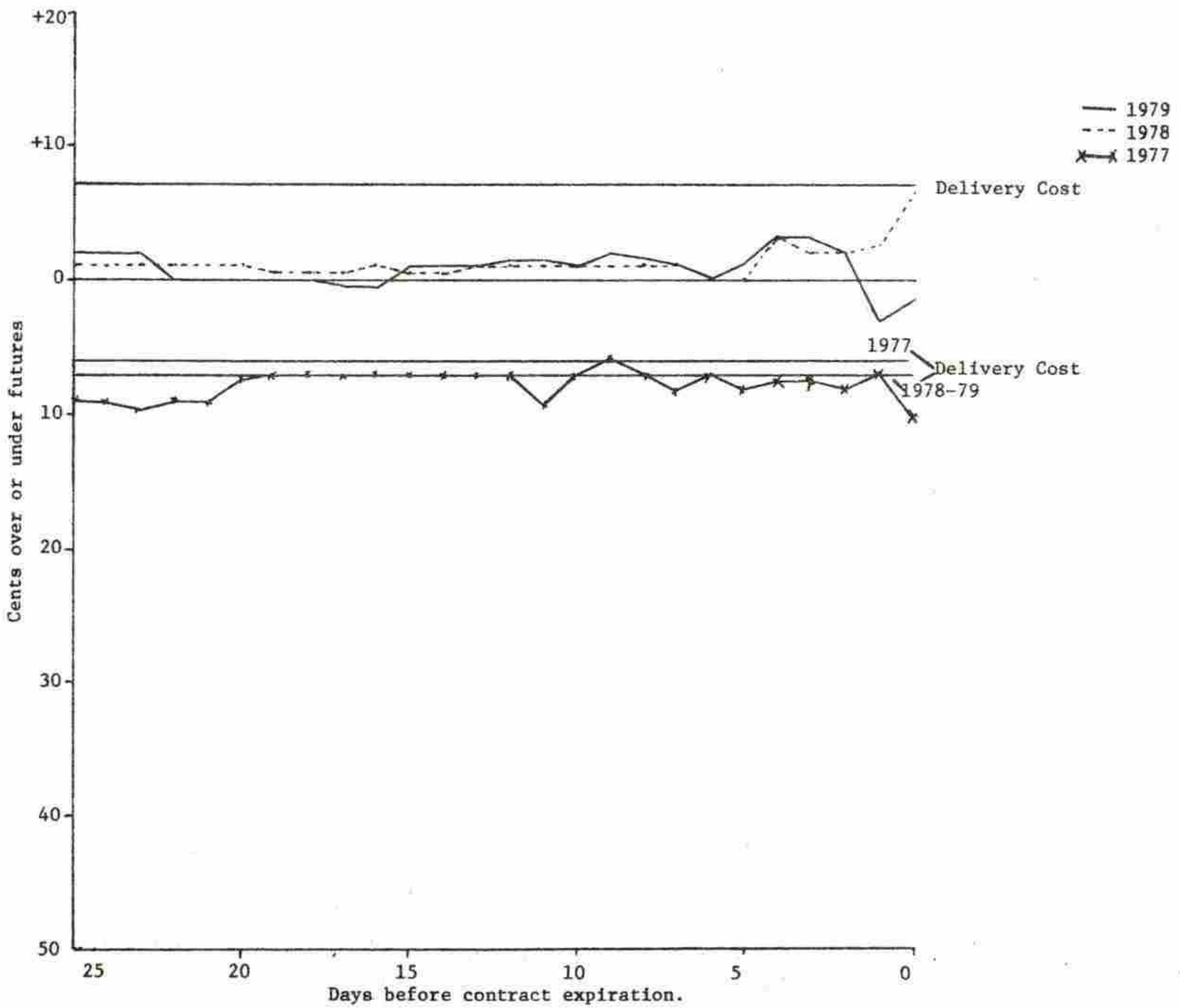

Figure 4-4. Chicago hopper car corn basis for the September futures, 25 days before contract expiration, 1977-79

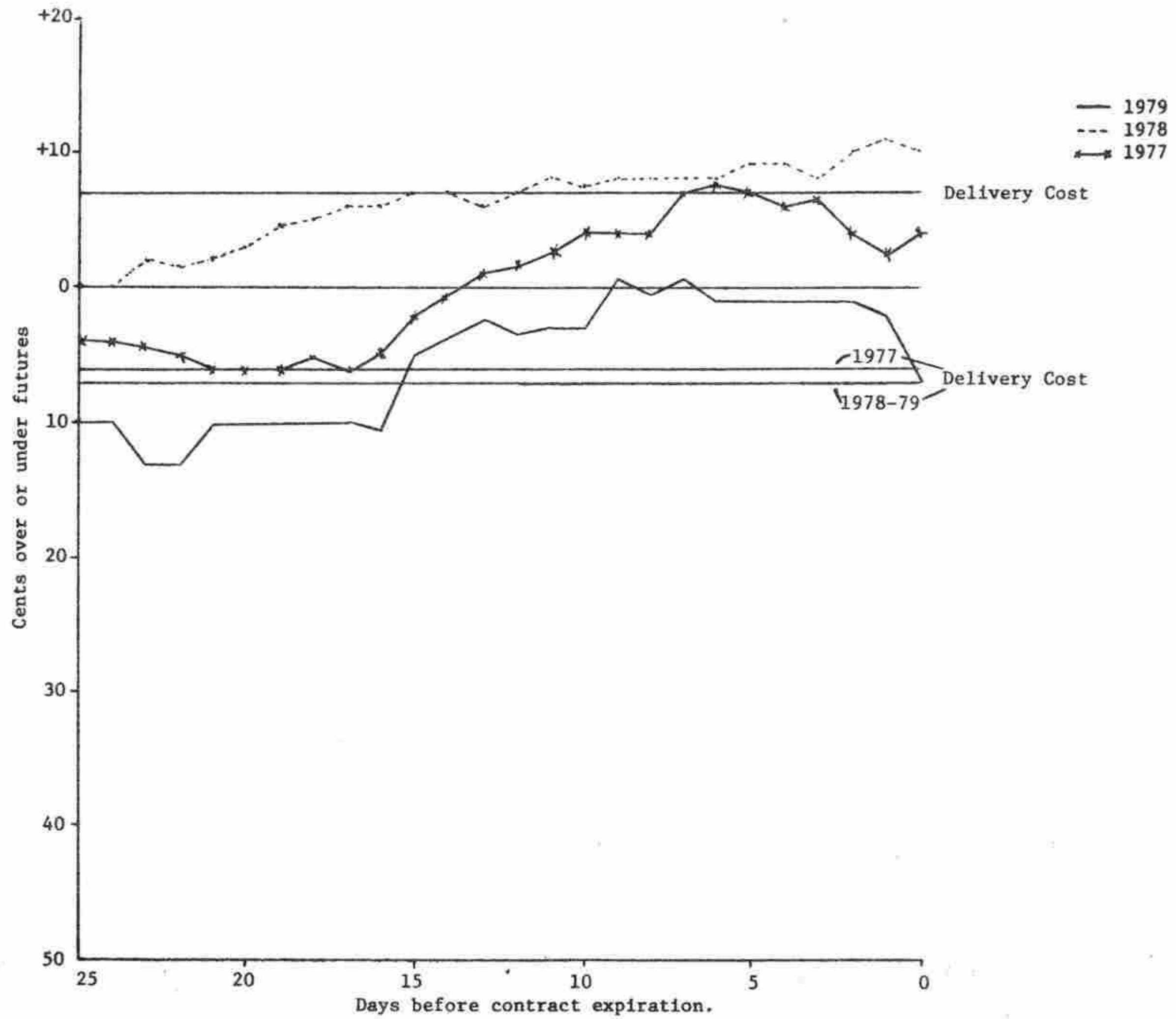

Figure 4-5. Chicago hopper car corn basis for the December futures, 25 days before contract expiration, 1977-79

these cars have a much greater tendency to develop leaks in transit than the jumbo covered hopper cars. As a result, Chicago boxcar bids typically have been discounted several cents per bushel under grain shipped in hopper cars in recent years.

Included in the basis charts are the costs incurred for making or taking delivery. The costs of making delivery on futures contracts include inspection, grading, interest, insurance, elevation and storage expenses, and are designated by a horizontal line below the zero line on the basis chart. The costs of taking delivery include a loadout charge along with weighing, inspection and grading, and are designated by the horizontal line above the zero line.

The patterns shown in the previously mentioned figures indicate that variability of the Chicago hopper car corn basis during the last 25 days of trading was relatively small at almost all times. One exception was in 1974 when the basis under the March futures about 15 days before contract maturity was somewhat volatile. In comparing the differences among contracts, there appeared to be little difference in basis variability with the exception of the December futures. The December futures tended to be more variable at the beginning of the 25 day period but during the remainder of the period it converged; within the delivery cost range in 1977 and 1979. The variability at the beginning of the period could be due to harvest pressures from large crops and limited storage facilities, lack of adequate transportation equipment and related conditions that affect the Chicago basis in late November. After the harvest has been completed, these pressures tend to diminish rapidly and thus permit the Chicago corn basis to move back into line with delivery costs.

It should be apparent after examining Figures 4-1 through 4-5 that the three conditions specified at the beginning of this section generally have been met by the Chicago hopper car corn basis. For this reason, it can be concluded that delivery on corn futures contracts has generally proceeded smoothly and that no evidence of serious impediments to delivery exists.

Chicago Soybean Basis

Figures 4-6 through 4-11 and Appendix Figures B-9 and B-10 show the Chicago soybean basis for the May, July, August, and November futures contracts and their corresponding delivery costs at Chicago. Only one Chicago cash bid is published for soybeans, with no differentiation between hopper and box car bids. This may be explained by a high percentage of soybeans sold in Chicago cash markets that normally are delivered by truck.

It is important to note that the grade specified in soybean futures contracts is No. 2 yellow, whereas Chicago cash soybeans are based on the No. 1 yellow grade. Futures contracts receive a three cent per bushel premium for No. 1 soybeans, whereas no premium or discount is taken if No. 2 soybeans are delivered on the contract. To take into account the difference in prices of grades, this analysis will adjust the costs of making delivery downward by the three cent difference due to the capability of purchasing a lower grade for delivery. The

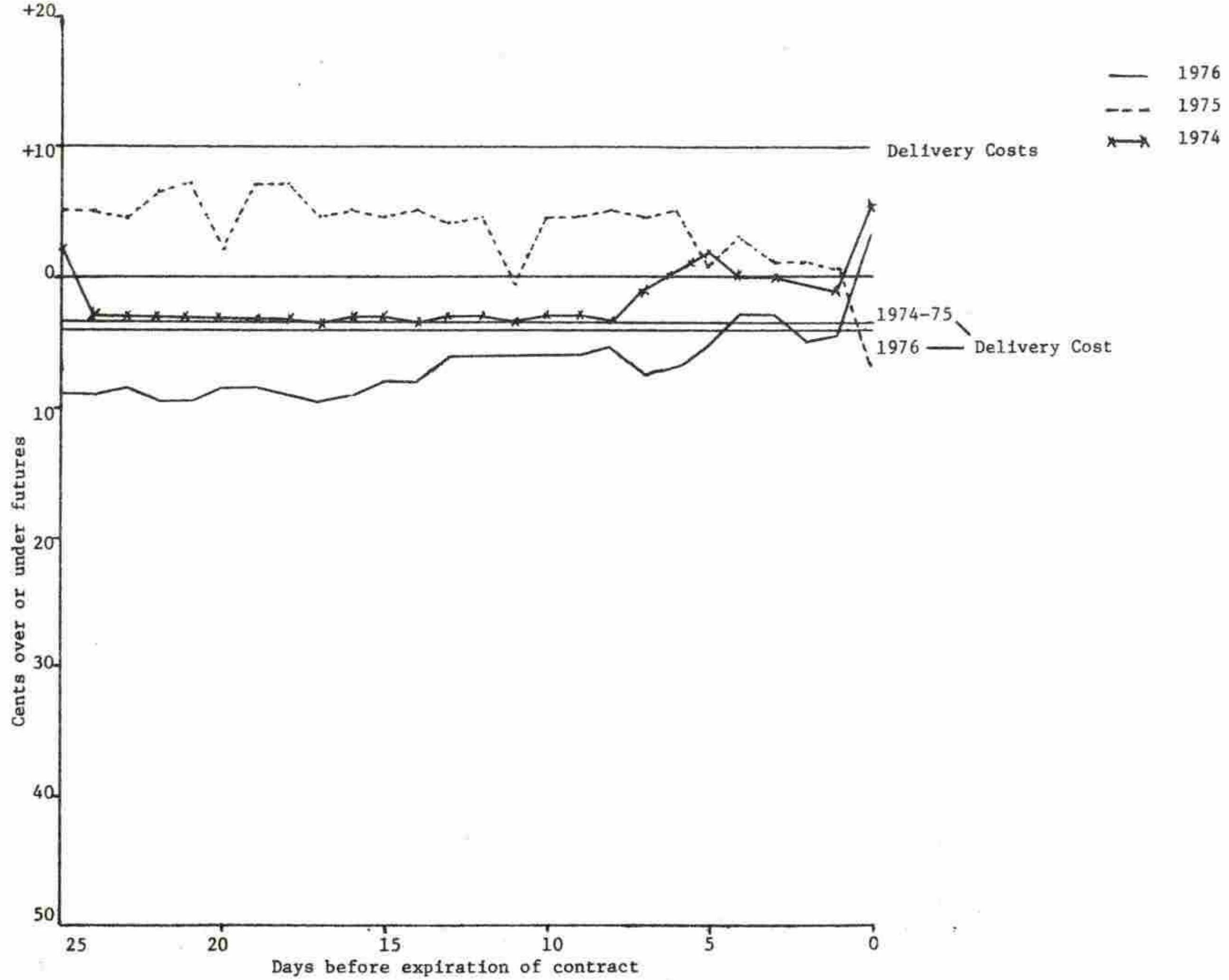

Figure 4-6. Chicago soybean basis for the May futures, 25 days prior to expiration, 1974-76

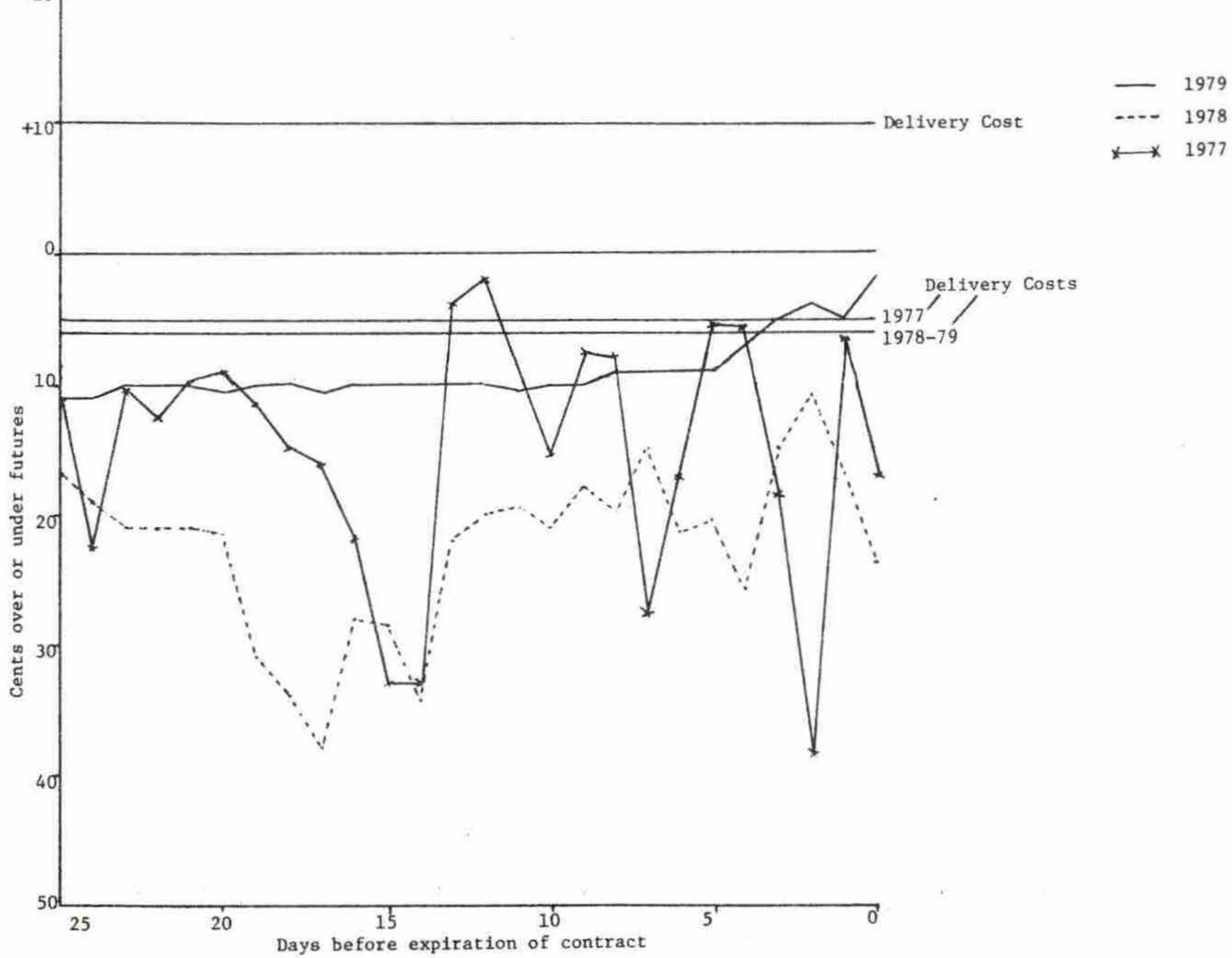

Figure 4-7. Chicago soybean basis for the May futures, 25 days prior to expiration, 1977-79

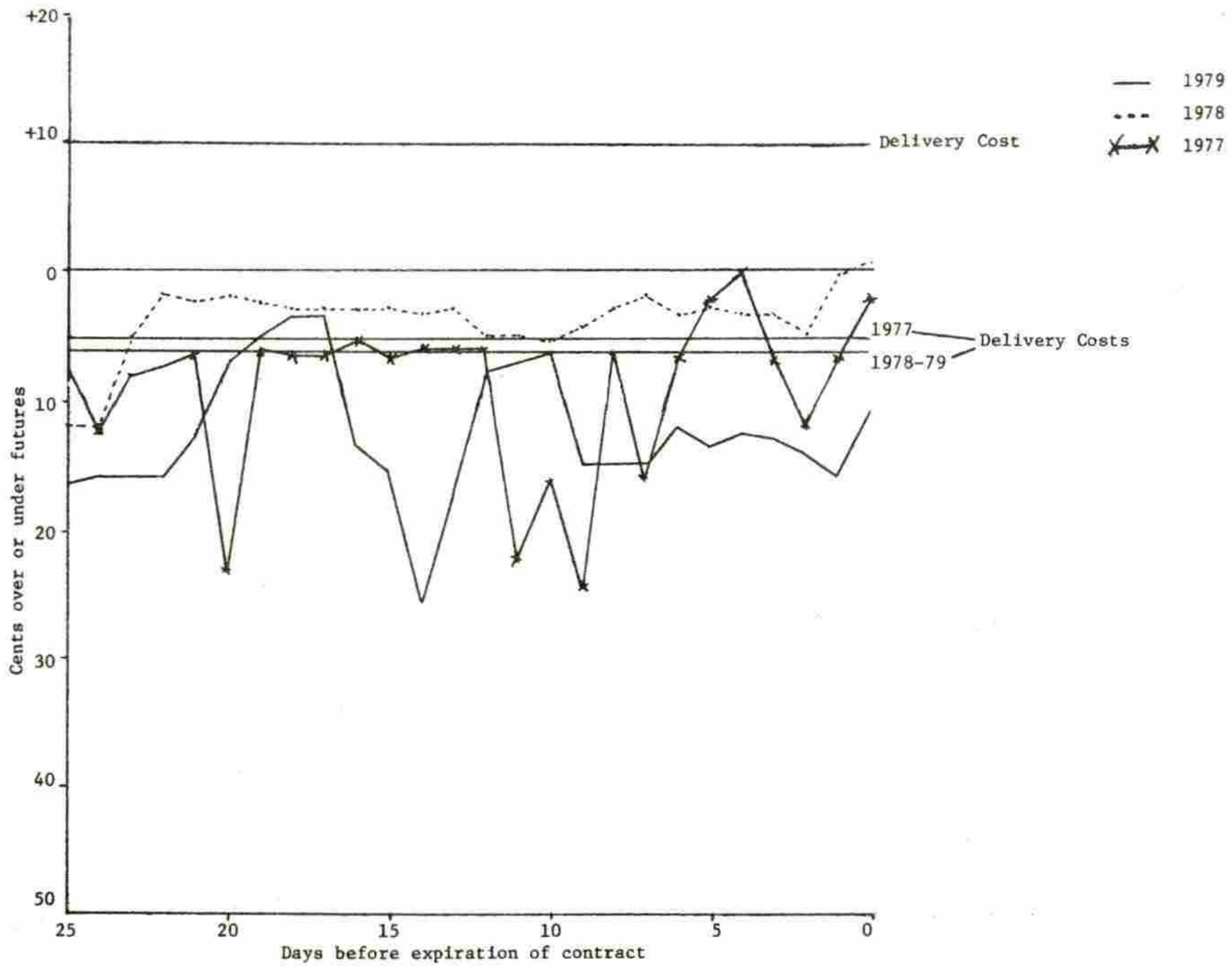

Figure 4-8. Chicago soybean basis for the July futures, 25 days prior to expiration, 1977-79

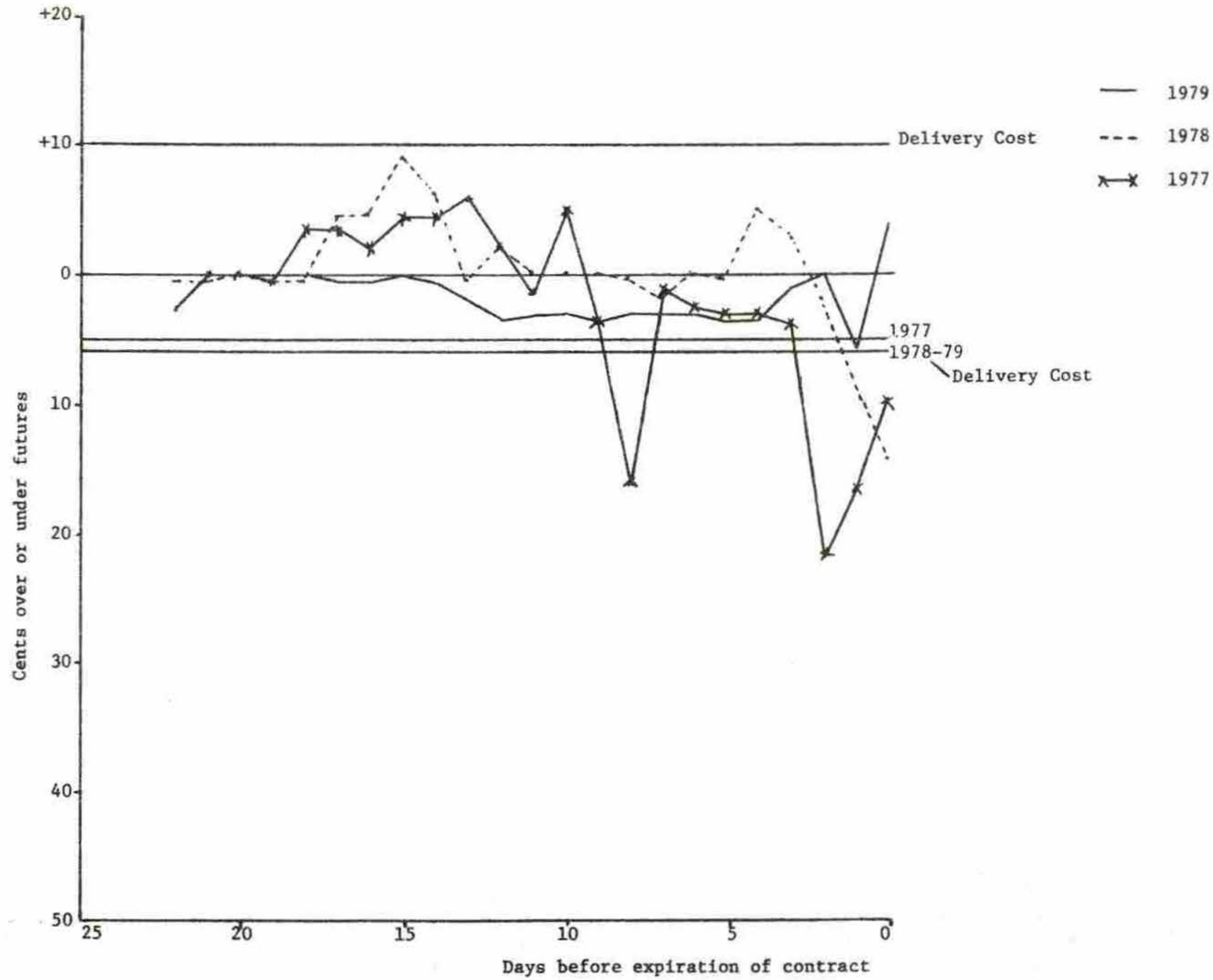

Figure 4-9. Chicago soybean basis for the August futures, 25 days prior to expiration, 1977-79

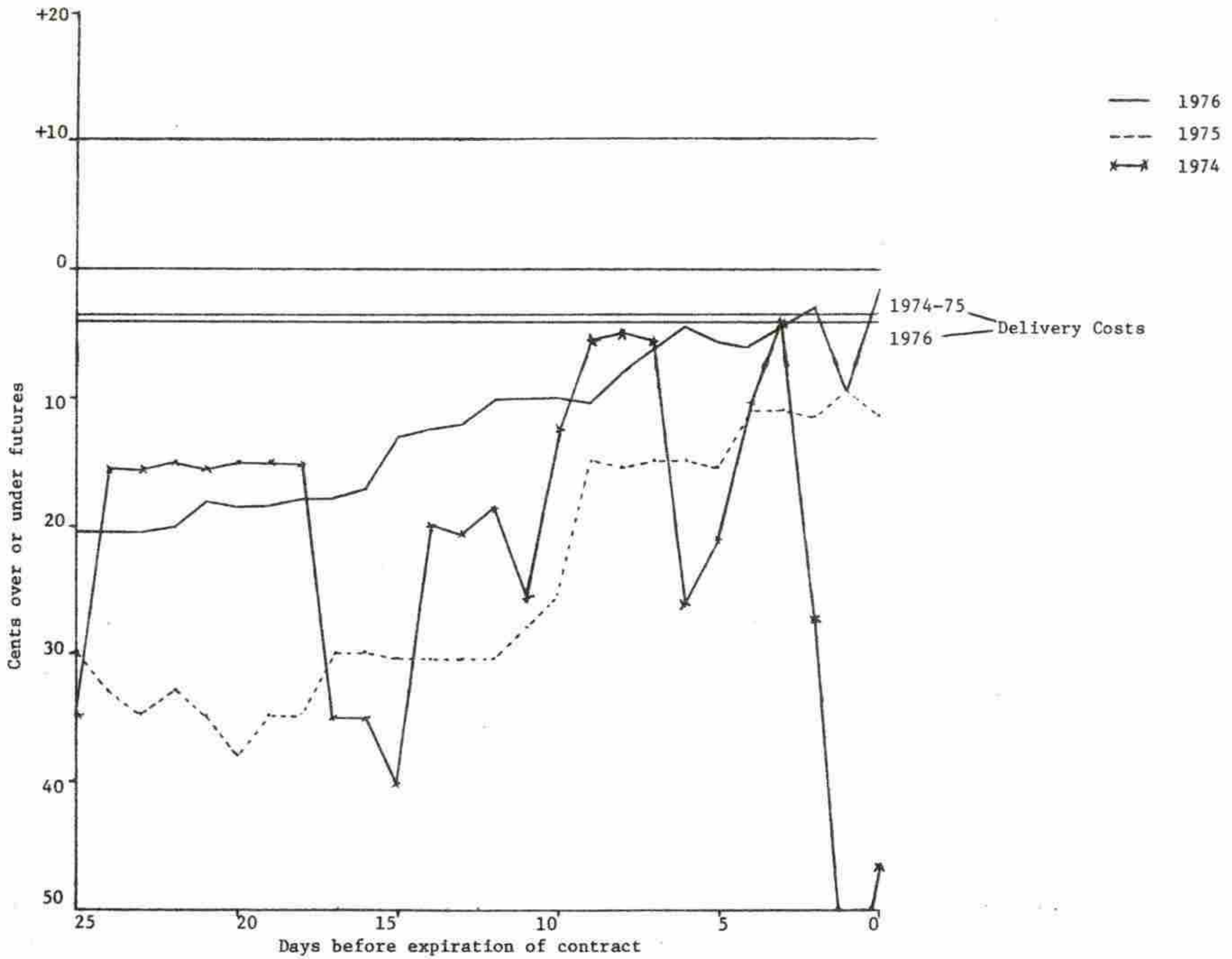

Figure 4-10. Chicago soybean basis for the November futures, 25 days prior to expiration, 1974-76

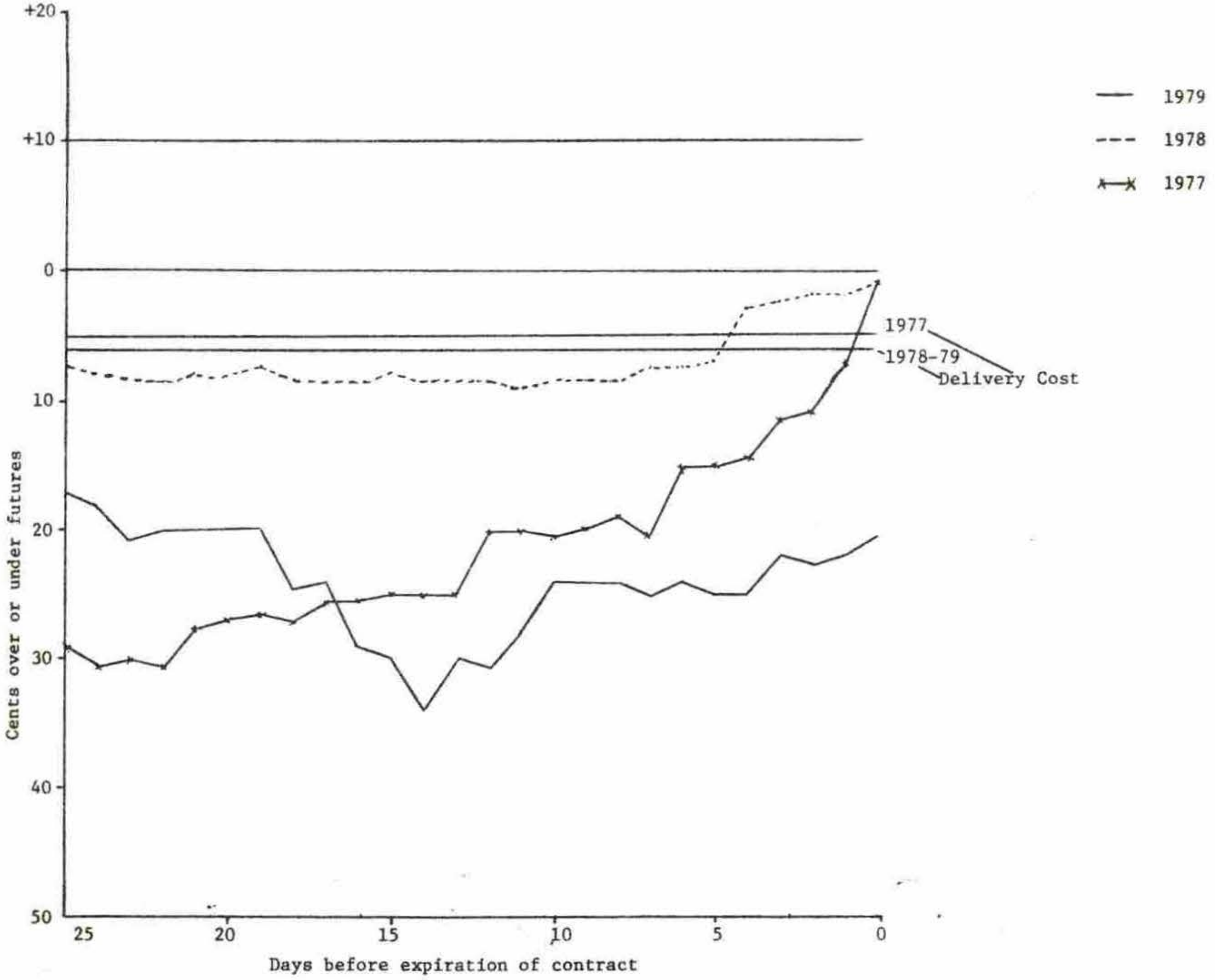

Figure 4-11. Chicago soybean basis for the November futures, 25 days prior to expiration, 1977-79

costs of taking delivery are adjusted upward by three cents per bushel to reflect additional costs of moving up a grade comparable to cash prices. For example, if the Chicago costs of making delivery are nine cents per bushel, the adjusted net delivery costs will be six cents per bushel.

Looking at Figure 4-6 note that the basis under the expiring May futures followed the expected pattern for the years 1974 and 1975. This pattern is similar to the patterns experienced for expiring corn futures contracts. However, the other years experienced an erratic basis pattern as the futures contracts expired. An example of this variability is the May futures during the last 25 days of trading in 1977, as shown in Figure 4-7, when it ranged from 33 cents per bushel under the expiring contract to 6 under and expired at 17 under. During the same period of 1978 the comparable basis ranged from 33 to 11 under, expiring at 24 under. It is apparent that during these two periods, an incentive to deliver existed. However, during both periods rapid fluctuations in the basis may have discouraged hedgers from attempting to make delivery. In 1979, the May basis reverted back to the expected pattern indicating no major impediments to deliver.

Figures 4-8 through 4-11 show the basis behavior under other soybean futures contracts as they approached maturity. Data in these figures suggest delivery on soybean futures has proceeded much less smoothly than the corn futures. There were several instances when the soybean basis at contract expiration was wider than the corresponding delivery costs. The soybean basis also tended to exhibit a downward bias rather than a distribution above and below the zero line with equal frequency.

If serious impediments to delivery occur at times, the Chicago basis could become wide and unpredictable, causing the local basis in Iowa and other areas to become distorted and wider than normal. This unpredictability could cause greater basis uncertainty on soybeans than on corn, making soybean hedging returns for producers more variable than on corn. Increased uncertainty likely would be compensated for by widening country elevator merchandising margins. For an example of this, note the increasing merchandising margins in the Chapter 3 discussion on total delivery costs to Chicago. Also, it should be noted that in the three instances where the Iowa soybean basis exceeded delivery costs, the Chicago basis also exceeded its corresponding delivery costs.

Reasons for greater soybean basis variability

Possible reasons for greater soybean basis variability than corn include differences in levels of stocks in deliverable positions and numbers of limit price moves during the last 25 days prior to contract expiration. In addition, delivery at times may have been discouraged by transit billing requirements as well as a lack of alternate soybean delivery points outside Chicago until September 1979.

Stocks of corn and soybeans in deliverable positions are listed in Table 4-1 for the dates shown for the period 1974 through 1979. These data show the amount of grain in approved warehouses in Chicago and thus available for immediate delivery on futures contracts. As

Table 4-1. Stocks of grain in deliverable positions in Chicago for Chicago Board of Trade and Mid-America commodity exchange futures contracts in exchange approved warehouses, 1974-79[a]

	Total deliverable stocks, all grades in thousands of bushels				
Date	Corn	Soybeans	Date	Corn	Soybeans
May 17, 1974	6,718	6,752	May 13, 1977	7,194	11,944
July 12, 1974	1,938	3,618	July 15, 1977	1,502	13,125
August 16, 1974	3,222	4,121	August 12, 1977	1,546	5,938
May 16, 1975	4,656	870	May 12, 1978	5,546	5,692
July 18, 1975	2,238	498	July 14, 1978	5,402	3,061
August 15, 1975	3,226	1,300	August 18, 1978	4,630	1,939
May 14, 1976	6,746	9,684	May 18, 1979	9,772	12,679
July 16, 1976	6,474	7,820	July 13, 1979	7,260	13,837
August 13, 1976	3,416	6,903	August 17, 1979	960	8,010

[a]Quantities were received by the Commodity Futures Trading Commission's Chicago office.

deliverable supplies decrease, the chance of an erratic basis behavior at contract maturity would logically increase. The reasoning behind this observation is that when deliverable stocks are large, delivery on futures contracts should be able to occur with relative ease. Small stocks may lead to more erratic basis behavior as the market attempts to entice the equilibrium amount of grain into deliverable positions from outlying areas.

For example, the Chicago basis under the May futures during the last 25 days prior to expiration in 1975, as shown in Figure 4-6, was somewhat volatile. The low deliverable stocks (870,000 bushels of soybeans) may have been a contributing factor to this pattern. Erratic basis behavior towards the end of trading in the 1978 May soybean futures also may have been caused by this condition. However, the May 1977 Chicago basis was erratic although the deliverable stocks were large at 11,944,000 bushels. The unusually low stocks of corn in July 1977 should also have contributed to an erratic basis pattern. However, looking at Figure 4-3, the Chicago corn basis was relatively stable and well within the delivery cost constraint at contract maturity. These results indicate basis behavior is not completely related to size of deliverable stocks. Thus, other determining factors may be involved.

Limit price moves of an expiring futures contract may cause an erratic basis to occur. Limit moves are defined here as a 30 cent per bushel movement up or down from the previous trading days' closing futures price for soybeans along with a 10 cent per bushel movement for corn. These daily price limits went into effect in October 1976.[1] For most trading days prior to October 1976, the maximum daily price limit for soybeans was 20 cents per bushel, although the limit was raised or removed in some instances through action by the CBOT. On limit move days, elevators often take "price protection" due to uncertainty about the following day's price action. This action could cause an unusually wide basis to occur at these times.

The number of limit moves for the May, July, and August futures contracts during the last 25 days prior to contract expiration for the period 1974 through 1979 is listed in Table 4-2. The larger the number of limit moves, the more erratic the basis pattern is likely to be. For example, during the last 25 days prior to the expiration of the July 1977 futures contract, 12 limit moves occurred. Looking at Figure 4-8, the July 1977 Chicago basis exhibited an erratic behavior. Also, the July 1978 Chicago basis was stable and no limit moves occurred during the last 25 trading days on this contract. However, the 1979 July Chicago basis exhibited an erratic behavior with the number of limit moves being relatively low at 5. All five of the limit moves occurred before July 6, 1979. The basis pattern remained relatively erratic from July 6 until the expiration of the contract. This would

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[1]Currently the daily limits on price moves are thirty cents per bushel and ten cents per bushel, respectively, for soybeans and corn. However, if limit price moves occur in the same direction for three successive trading days on three or more contracts in the same crop marketing year, the limits are increased to forty-five and fifteen cents, respectively, for soybeans and corn for the next three days of trading. In the absence of continued limit moves during this three-day period, the daily price limits then revert back to their original level.

Table 4-2. Number of limit price moves occurring on soybean futures contracts within the last 25 trading days prior to contract expiration, 1974-79[a]

Contract month	Number of limit moves	Contract month	Number of limit moves	Contract month	Number of limit moves
May 1974	3	May 1976	0	May 1978	1
July 1974	10	July 1976	13	July 1978	0
August 1974	16	August 1976	7	August 1978	0
May 1975	2	May 1977	15	May 1979	0
July 1975	3	July 1977	12	July 1979	5
August 1975	9	August 1977	5	August 1979	0

[a]Number of limit moves was determined by observing the day to day changes in futures prices as presented by the Wall Street Journal.

indicate basis behavior is not completely related to number of limit moves.

The delivery of soybeans to fulfill a futures contract was discussed in Chapter 3. It was pointed out that trade sources indicate a high percentage of the soybeans moved into Chicago are shipped by truck. If truck soybeans are delivered on futures contracts, a transit billing requirement must be met. Transit billing, as an additional cost to truck delivery, may discourage delivery on futures contracts at times. When this occurs, it may also result in an erratic basis pattern.

One alternative to encourage greater stability in the Chicago soybean basis would be to add an additional delivery point(s). This was done beginning with the September 1979 futures contract, although additional time will be needed before its impact can be accurately evaluated.[1] Heifner, along with additional delivery points, suggests the possibility of allowing for a wider range of grades to be delivered on futures contracts to expand the deliverable supply.[2] Expansion of deliverable supplies would increase the threat of delivery and could contribute to a more stable basis pattern as contract expiration is

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[1]For a discussion of alternative points and their potential role in futures markets, see Robert N. Wisner and J. Marvin Skadberg, "A Proposal for Multiple Corn and Soybean Futures Delivery Points," Iowa State Cooperative Extension Service, M-1068, August 1973.

[2]For an excellent presentation of possible solutions to erratic basis patterns associated with futures markets, see Richard G. Heifner, "Report on a Study of the March 1979 Chicago Wheat Futures Contract," unpublished paper by the Agricultural Market Service of the U.S. Department of Agriculture sponsored by the Ninety-sixth Congress of the United States.

approached. This would allow expiring futures to more accurately reflect the "true" commercial value of the commodity and would improve predictability of hedging returns.

Heifner also calls for the setting and enforcing of more stringent position limits during the delivery period, with the position limits adjusted weekly depending upon the deliverable supply.[1] As a general guide, it seems reasonable to require that positions which individual traders are permitted to hold, not exceed the deliverable supply. For commodities whose deliverable stocks are regularly estimated, a suggested procedure would be to limit each trader to no more than one third of the deliverable supply during the last five trading days prior to contract expiration.[2] If individual "traders" positions exceed quantities readily available for delivery, an erratic basis pattern could occur and conditions for a potential market "squeeze" would be present. A squeeze exists when one or a few traders are in the position to manipulate the market price. Their open positions may be on the long or short side of the market, although the long position is more common. In this case, the squeezer holds his long position and calls for delivery of quantities that are larger than the deliverable supply. Traders who are in short

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[1] A position limit may be defined as the maximum number of outstanding contracts a speculator can hold at any given time. Currently, the position limit on corn and soybean futures contracts as prescribed by exchange rules and enforced by the CFTC is a total of three million bushels per trader. This limit applies to the total of all outstanding contracts held in all futures contract months for each individual commodity. Position limits on corn and soybeans are not applied to hedgers.

[2] Richard G. Heifner, "Report on a Study of the March 1979 Chicago Wheat Futures Contract," p. 20.

positions must then pay a higher price to release themselves from their positions or to transport the commodity from distant locations.

Heifner expresses the view that variable position limits could allow futures prices to approach their "true" value at delivery time. This would permit the market to more effectively serve its hedging function without large physical deliveries being made.[1]

The next chapter deals with the marketing alternatives associated with post-harvest periods. An in-depth look at the profitability of storage hedges will be presented.

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[1]Ibid., p. 22.

CHAPTER V. INTERTEMPORAL PRICE RELATIONSHIPS AND THEIR EFFECTS ON STORAGE HEDGING RETURNS

As discussed in Chapter 2, a storage hedge is accomplished by selling futures contracts at harvest and storing the cash crop until some later date. For producers who store on the farm, the grain would typically be held until late spring of the following year when the basis historically narrows. At that time, the hedge would be removed by simultaneously selling the cash crop and buying back futures contracts to close out the futures position.

Intertemporal price relationships (i.e., price relationships or price variations through time) are based on the demand for storage and the cost of carrying the crop from harvest to some later date when it is sold. These price relationships are an important influence on potential returns to producers for storage hedges. The costs of carrying the crop can be defined as the expenses incurred in holding a commodity of a given quality at a specific location for different delivery dates. These expenses consist of three main elements: storage, insurance, and interest on the crop. The return to cover storage expenses is reflected in price differences between different futures contract maturities and in seasonal basis changes.

Intertemporal Price Relationships

An analysis of storage costs suggests that the cash price for a storable commodity at harvest should be below the December futures price by the cost of carrying the crop from harvest to December. In the same way, the price of the December futures contract should be less than March by the cost of carrying the crop from December to March, and similarly for other futures prices through the July contract. Table 5-1 shows the spreads or differences between successive futures contract months on selected days during the 1978-79 marketing year. These spreads are the potential returns being offered for storage by the futures market at any point in time for the period shown. They often are referred to in the grain trade as carrying charges.

The theory of the carrying charge is based on the following conditions: (1) storable commodities are produced at one time of the year but are consumed fairly evenly throughout the marketing year; (2) there are costs incurred in carrying and maintaining the quality of inventories; and (3) there are essentially no costs incurred in holding a futures contract.[1] Due to these facts it follows that cash prices should increase in relation to futures as the marketing year progresses.

In the example in Table 5-1, the spread between the December and March corn futures in October of 1978 was 10 cents per bushel. The hedger would need to decide if this spread is large enough to cover his costs of storage from December to March. If the spread exceeds his expected costs, he may wish to hedge his grain and store it into the following spring. Thus, carrying charges in futures markets will affect hedging decisions. Also note the March-May, May-July, and July-September corn spreads in 1978-79, as shown in Table 5-1. These

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[1]Thomas A. Hieronymus, Economics of Futures Trading (New York: Commodity Research Bureau, Inc., 1971), p. 153.

Table 5-1. Corn and soybean futures spreads, Chicago Board of Trade[a] 1978-79

		Corn				Soybeans				
1978		Dec.-Mar.	Mar.-May	May-July	July-Sept.	Nov.-Jan.	Jan.-Mar.	Mar.-May	May-July	July-Sept.
Oct.	5	10	6	3	2	7	7	3	1	-25
	12	10	6	2	0	5	7	1	1	-31
	19	10	7	4	3	9	9	5	-1	-25
	26	9	7	3	1	8	10	3	2	-31
Nov.	2	10	6	4	2	12	11	6	1	-34
	9	9	7	3	2	11	13	6	3	-24
	16	10	7	4	2	13	12	6	5	-29
	22	11	7	4	1		10	8	2	-29
	30	11	8	5	1		13	7	4	-31
Dec.	7	12	8	6	1		13	7	2	-32
	14	12	8	5	1		12	7	3	-28
	21		8	6	4		15	9	4	-35
	28		8	6	3		16	10	5	-29
1979										
Jan.	4		8	5	3		13	8	6	-26
	11		8	5	2		13	7	5	-27
	18		8	5	2		12	9	6	-31
	25		9	6	1			10	8	-32
Feb.	1		8	5	2			13	9	-32
	8		9	5	2			15	8	-51
	15		10	6	4			15	9	-54
	22		11	6	4			16	8	-60
Mar.	1		11	7	3			16	12	-44
	8		7	5	3			16	9	-41
	15		5	3	3			13	8	-42
	22			3	2				7	-46
	29			4	3				9	-45
Apr.	5			4	3				9	-37
	12			4	3				13	-28
	19			4	2				14	-33
	26			6	4				15	-25
May	3			5	2				17	-15
	10			4	3				17	-12
	17			5	2				16	- 6
	24				3					- 6
	31				3					- 6
June	7				5					- 3
	14				7					12
	21				3					- 7
	28				4					0
July	5				1					3
	12				1					2
	19				0					- 5

[a]Source: Futures spreads were calculated by taking the difference between Chicago Board of Trade closing futures prices obtained from the Wall Street Journal.

spreads generally were too small to cover full commercial costs of carrying the crop from March through September profitably.

In examining corn and soybean futures spreads, it is important to note that September does not always fit into the intertemporal pattern normally shown by other contracts. September is a transitional month, coming before the new crop is readily available, but after some parts of the country have begun to harvest corn and soybeans. In some years, the market offers corn and soybean hedgers a positive return for storage from July to September, while in other years the return is negative. The return in individual years depends heavily on the level of old crop supplies, crop maturity, and the expected timing of the start of harvest.

The difference or spread between two quoted futures prices for different delivery dates can also be referred to as the price of or the return for storage. This price difference is a price of storage, determined in a free market through competition between those who seek to provide or acquire services.[1] The price of storage will vary from time to time, depending on the level of supply and demand for storage.

Supply and demand for storage

The demanders of storage consist of a group of firms who desire to have stocks carried for them from a period in which they do not intend to consume them, into another period, in which the stocks will

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[1]Holbrook Working, "The Theory of Price of Storage," American Economic Review 39, No. 6 (December 1949):1254-62.

be consumed.[1] The demand for storage of a commodity can be derived from the demand for its consumption, under the assumption that all variables affecting consumption except price are exogenously determined.

The demand function for consumption in period t may be written:[2]

$$p_t = f_t(C_t), \ \frac{df_t}{dC_t} < 0,$$

where p_t is price in period t and C_t is consumption in period t. The subscripts indicate that the variables may shift over time. With a fixed demand function, the price in period t is determined by the intersection of the supply and demand for the commodity. This can be written:

$$p_t = f_t \ (S_{t-1} + X_t - S_t);$$

where S_{t-1} represents inventories at the end of period t-1, X_t is production in period t, and S_t is stocks at the end of t. In other words, at the equilibrium price, consumption equals the change in supplies during the period. For simplicity, it is assumed that current and subsequent production and inventories are known.

In the same way, the price of the commodity in period t+1 can be written:

$$p_{t+1} = f_{t+1} \ (S_t + X_{t+1} - S_{t+1}).$$

If S_t increases, this would shift the commodity supply function to the

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[1]Michael J. Brennan, "The Supply of Storage," American Economic Review 48, No. 1 (March 1958):51.

[2]Ibid.

left in period t, raising p_t, assuming all other conditions remain constant. At the same time, the commodity supply function for period t+1 will shift to the right, lowering p_{t+1}, again assuming all other conditions remain constant. The demand for storage can now be expressed as follows:

$$p_{t+1} - p_t = f_{t+1}(C_{t+1}) - f_t(C_t)$$

or

$$p_{t+1} - p_t = f_{t+1}(S_t + X_{t+1} - S_{t+1}) - f_t(S_{t-1} + X_t - S_t).$$

The partial derivative for this equation with respect to S_t is negative. This means that with S_{t-1} known and X_t, X_{t+1}, and S_{t+1} exogenously determined, the price spread increases as S_t decreases. In other words, the demand for storage is negatively related to the price spread. With all other conditions remaining constant, the demand for storage will shift upward (or increase) due to: (1) an increase in production in t; (2) a decrease in production in t+1; or (3) an increase in stocks carried out of t+1.[1]

The supply of storage refers to the supply of commodities as inventories, rather than the supply of storage space.[2] A firm attempting to maximize net revenue will provide additional storage of a commodity until the net marginal cost per unit of time just equals the expected change in price per unit of time. The net marginal cost of

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[1] Ibid., p. 52.

[2] Ibid., p. 51.

storage need not be positive.

According to Figure 5-1, there is a large segment of the storage supply curve that is in the negative region. In other words, storage will be supplied even if futures price spreads are negative. This may be due partly to the fact that most costs of grain storage are fixed in the short-run. Also, owners of storage facilities usually are engaged in other enterprises such as merchandising or processing, and maintain storage facilities to support these activities. For this reason, costs of storage may be charged to the other segments of the business which remain profitable.[1] Working also points out that all goods possess a "convenience yield."[2] The marginal yield of these stocks falls sharply with an increase in stocks above "requirements" and may rise very sharply with a reduction below "requirements."[3] The convenience yield is attributed to the advantage, in terms of lower cost and less delay, of being able to keep regular customers satisfied and to take advantage of a rise in demand and price without changing production schedules.[4] This explains why some inventories are carried even if the apparent return from storage as reflected by futures price spreads is zero or negative.

The net marginal cost of storage can be defined as the marginal

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[1] Holbrook Working, "The Theory of Price of Storage," p. 260.

[2] Ibid.

[3] Nicholas Kaldor, "Speculation and Economic Stability," Review of Economic Studies 7 (1939-40):4.

[4] Michael J. Brennan, "The Supply of Storage," p. 53.

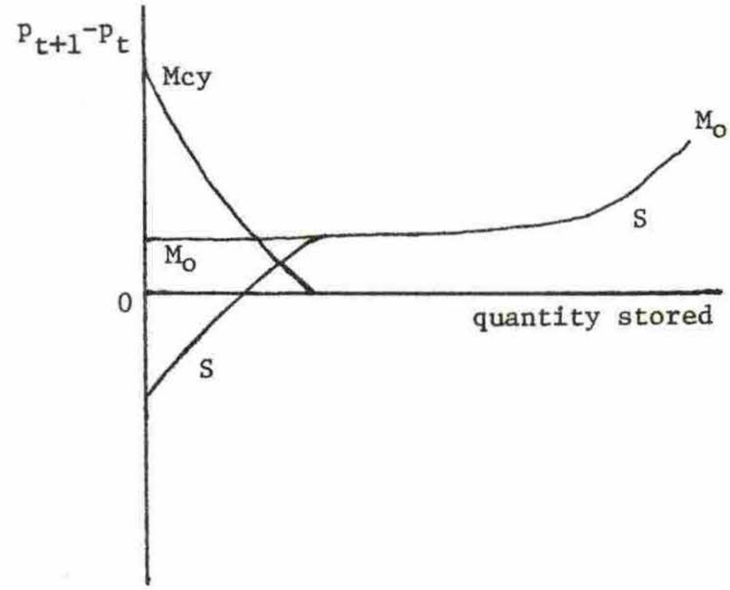

Figure 5-1. Storage supply function

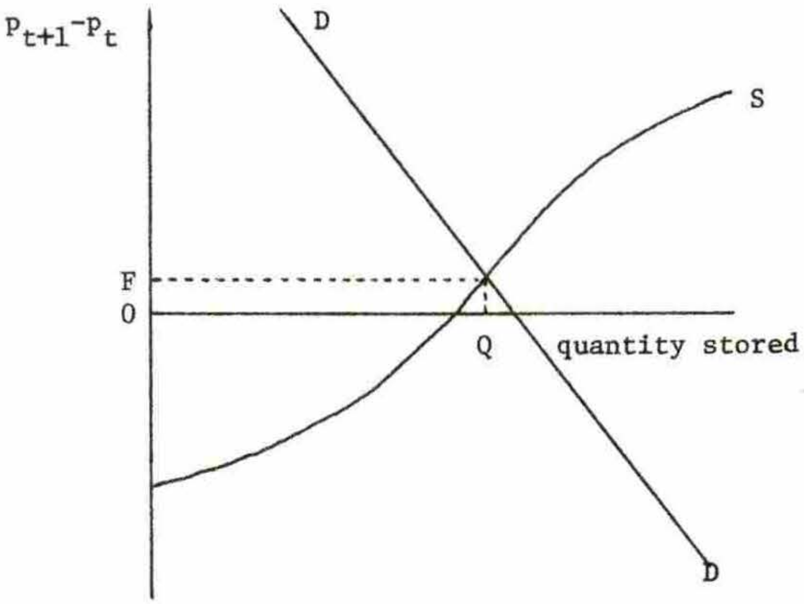

Figure 5-2. Equilibrium supply and demand for storage

outlay on physical storage plus a marginal risk aversion factor minus the marginal convenience yield on stocks.[1] The total outlay on physical storage consists of storage, handling charges, interest, and insurance. For any single firm the total outlay may increase at either a constant or an increasing rate. However, at the industry level, the marginal outlay may be approximately constant until warehouse capacity is almost fully utilized. Beyond this level, the marginal outlay would be expected to rise at an increasing rate.

Based on these conditions, a theoretical supply of storage, along with the marginal outlay and marginal yield are shown in Figure 5-1. The curve Mcy is a marginal convenience yield while Mo is the marginal outlay. If stocks are small, Mcy is larger than Mo. Under these conditions, storage will be supplied at a negative price. With a competitive industry, SS in Figure 5-1 will be the storage supply function. The expected return for storage is the difference between present price and the future price, while SS is the net marginal cost of storage.

The intersection of the supply and demand for storage is the equilibrium point, determining the price spread as shown in Figure 5-2. The difference between p_t and p_{t+1} must just equal the net marginal storage cost between the two periods. At this point, the price spread will be F, with Q being quantity stored as shown in Figure 5-2. Price and quantity in each period is determined by the commodity supply and

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[1] Ibid.

demand. The price difference as determined in Figure 5-2 is the return for storage.

Figure 5-3 shows the supply and demand for a commodity in periods t and t+1. The equilibrium points marked by the intersection of the supply and demand curve represent the optimum quantity and price for each period. The difference between the equilibrium prices of the two periods ($p_{t+1} - p_t$) represents the return for storage.

The preceding models were presented as a framework for better understanding how future price spreads are determined and how returns for storage vary with current and expected future market conditions.

Inverse carrying charges

At times, prices for deferred futures contracts are below prices of the nearby futures months. In this case the market reflects what is known as an "inverse carrying charge."[1] This type of intertemporal price relationship is illustrated by the spread between the July and September soybean futures contracts throughout the 1978-79 marketing year, as shown in Table 5-1. It should be noted that this July-September relationship is a common occurrence. A more unusual inverse carrying charge is reflected in the May-July spread on October 19, 1978. Inverse carrying charges generally are characterized by: (1) strong current demand for the commodity; (2) limited producer marketings; and (3) expectations that demand will decline and marketings will increase

[1]Holbrook Working, "Theory of the Inverse Carrying Charge in Futures Markets," Journal of Farm Economics 30, No. 1 (Feb. 1948):1-28.

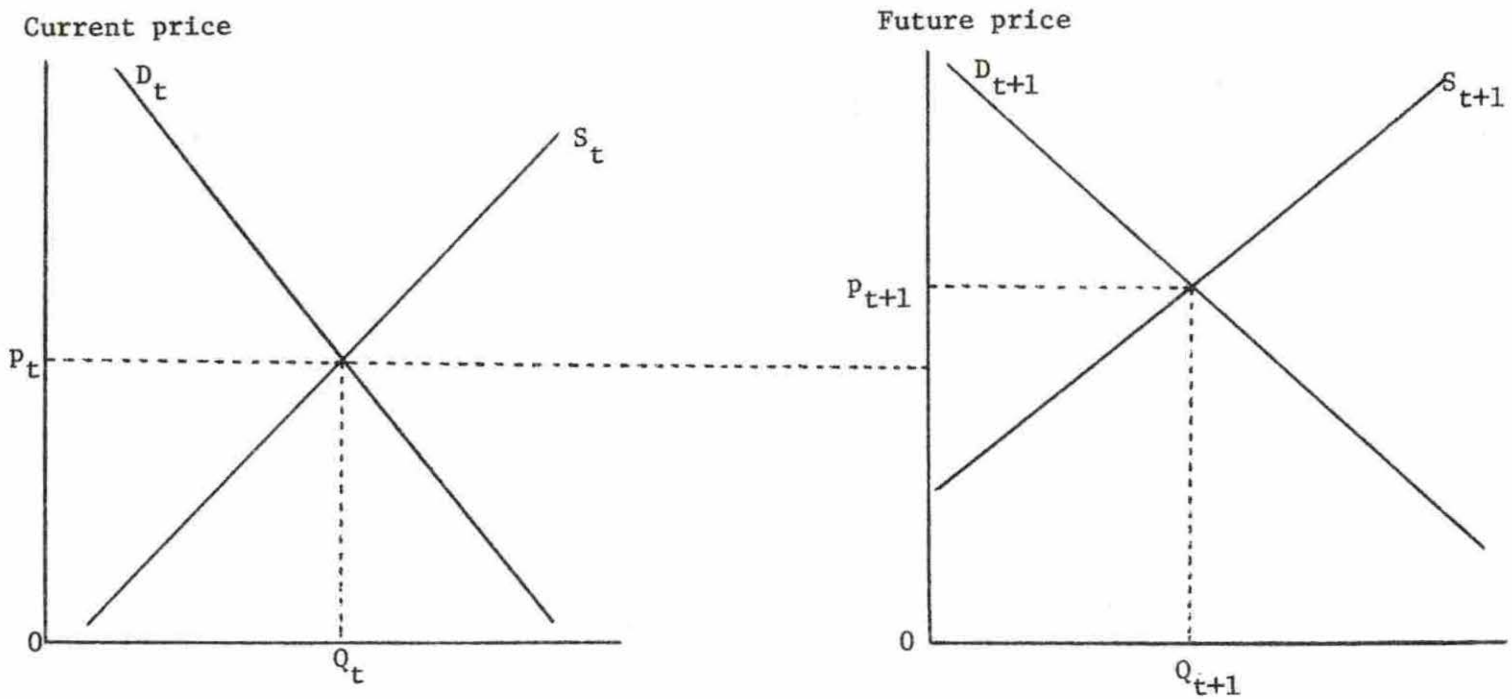

Figure 5-3. Equilibrium supply and demand for a commodity in current and future time periods

later in the marketing year. In effect, demand for storage is limited and Working's "convenience yield" is influencing price spreads at such times. Producer storage hedges under inverse carrying charge conditions generally would not be profitable, since the market would be reflecting negative returns for storage. Under such conditions the market is indicating it wants the commodity now rather than later.

With this background on factors influencing futures price spreads and storage returns, let us turn to an evaluation of storage hedging returns in Northwest and Southeast Iowa.

Storage Hedging Results

The main purposes of a storage hedge are to take advantage of basis improvement and potential increases in returns from the crop, while protecting oneself from the risk of lower prices during the storage period. One problem faced by producers who hedge is to determine the optimum time to place and lift the storage hedge. During the marketing years from 1974 through 1979, the ideal timing of the storage hedge varied slightly from year to year, district to district, and between crops depending on market conditions. To maximize gross returns, as shown earlier, the hedge should be placed when basis is wide, and lifted when it is narrow.

Figures 5-4 through 5-7 and Appendix Tables C-1 and C-2 show storage hedge basis figures in cents under July futures. The figures reveal the July basis patterns for the 1977-78 and 1978-79 marketing years while the 1974-75 through 1978-79 marketing year patterns are shown in the appendix tables. For instance, the optimum time to place

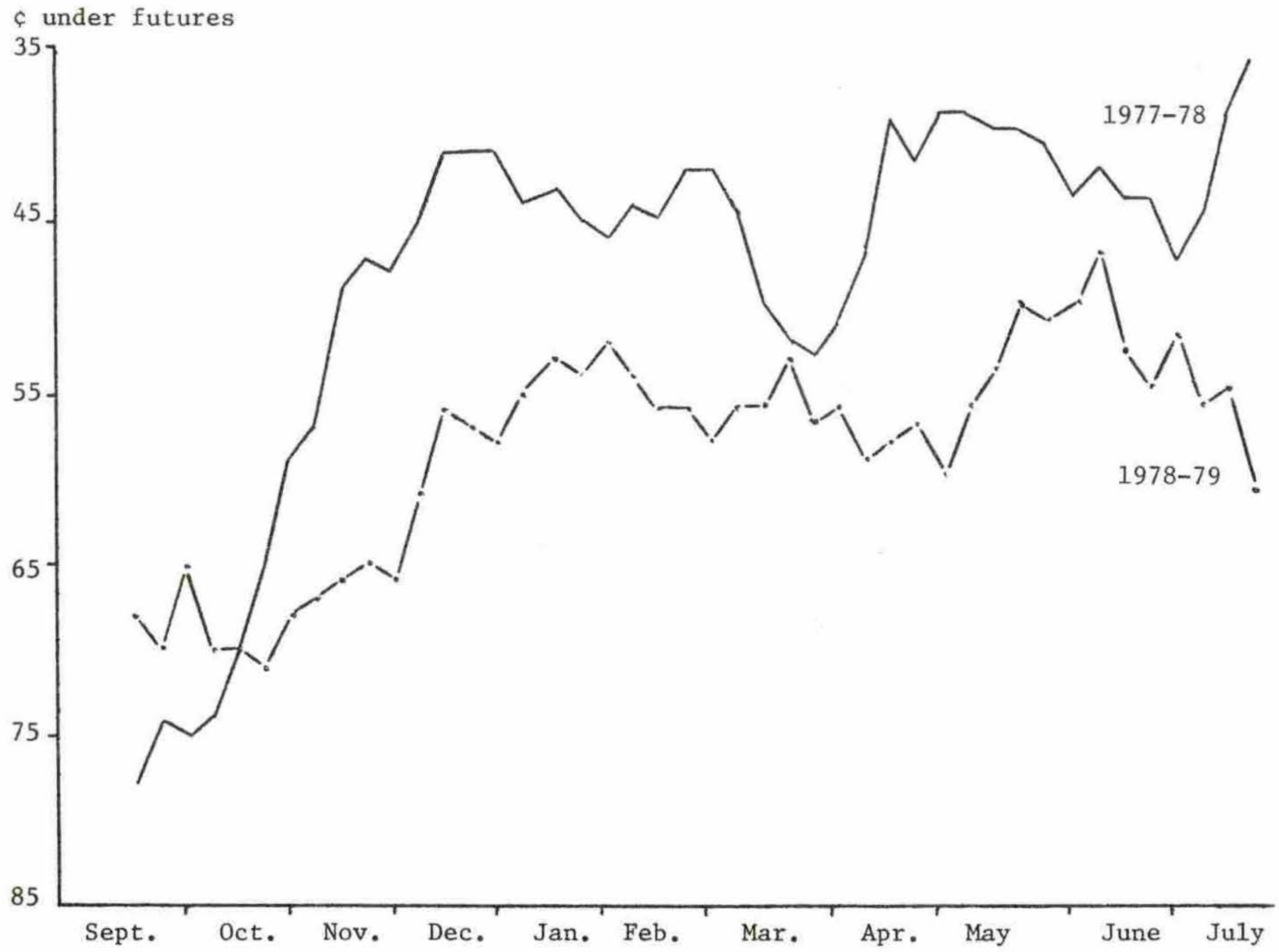

Figure 5-4. Weekly Northwest Iowa corn basis, 1977-78 and 1978-79 marketing years in cents under July futures

Figure 5-5. Weekly Southeast Iowa corn basis, 1977-78 and 1978-79 marketing years in cents under July futures

Figure 5-6. Weekly Northwest Iowa soybean basis, 1977-78 and 1978-79 marketing years in cents under July futures

Figure 5-7. Weekly Southeast Iowa soybean basis, 1977-78 and 1978-79 marketing years in cents under July futures

a storage hedge for corn in Northwest Iowa would have been the first week of October in the 1977-78 marketing year, and in the fourth week of October for the 1978-79 marketing year.

In soybeans, the timing of the hedge for these two marketing years would have been in the first week of October and first week of November respectively. Southeast Iowa differed somewhat from the Northwest district during this period, with the optimum time to place a storage hedge for corn being in the first week of October in the 1977-78 marketing year, and the third week of October for the 1978-79 marketing year. A soybean storage hedge as with the Northwest district, would have been placed in the first week of October and first week of November respectively. The maximum gross returns that could have been received from storage hedges during the period 1974 through 1979 for the two districts are shown in a later section of this chapter.

The seasonal patterns shown in Figures 5-4 through 5-7 and Appendix tables C-1 and C-2 reveal a general upward basis movement from harvest until the following spring. This seasonal pattern would be a major factor in determining the timing of storage hedges. Although the basis movements between years, districts, and crops varied somewhat, the general tendencies remain similar. Looking at Figures 5-4 through 5-7 it is obvious that all years are not the same. There exist year-to-year variations in harvest lows and post-harvest basis recovery as storage and transportation situations change, raising the basis into the following spring.

In this analysis, potential hedging returns were analyzed for three different lengths of storage; three, six, and approximately eight months. Hedges were assumed to be placed at the widest harvest-time basis, then lifted after twelve and twenty-four weeks for the three and six month storage periods, respectively. The eight month hedges were lifted either on the thirty-six week of storage or the last week of June, whichever came first. In each case, hedging returns were calculated using July futures prices.

Local supply and demand along with transportation conditions can cause the local basis to vary from year to year. For example, if the corn futures basis in October is 90 cents under July and the supply of corn seems likely to exceed available storage space, this would indicate that the basis may become wider than the current 90 cents. Under these conditions, local elevators would be expected to begin buying corn and storing it on the ground, with the basis being depressed further to cover the risks of quality deterioration.

In the following spring, suppose the normal Southeast basis is 40 cents under July at this time. If local demand exceeds local supply, hedging returns probably can be increased by holding the grain until the basis narrows further before lifting the hedge.

Corn hedging results

Tables 5-2 and 5-3 show the maximum gross returns available from hedging programs with three and six month storage, and storage into late June. Hedging returns also are compared to the increase in cash prices during the same periods for both the Northwest and Southeast

Table 5-2. Gross returns for three, six and eight months' storage of hedged and unhedged corn in Northwest Iowa by marketing years, 1974-75 through 1978-79, in dollars per bushel

Marketing year (Oct. - Sept.)	Three months storage		Six months storage		Eight months storage[a]	
	Hedged	Unhedged	Hedged	Unhedged	Hedged	Unhedged
1974-75	$ .21	$-.34	$ .40	$-.68	$ .39	$-.78
1975-76	.19	.02	.27	.03	.29	.33
1976-77	.22	-.05	.22	-.06	.34	-.27
1977-78	.34	.33	.22	.45	.31	.55
1978-79	.17	.05	.13	.15	.19	.58
Average gross return	$ .226	$ .002	$ .248	$-.042	$ .304	$ .082
Range of returns[b]	$ .17	$ .67	$ .27	$1.13	$ .20	$1.36

[a]This alternative involves storage into late June. In years when the peak harvest period occurred in November, slightly less than eight months' storage was involved.

[b]Range from highest return to lowest return per bushel over the time period presented here.

Table 5-3. Gross returns for three, six and eight months' storage of hedged and unhedged corn for Southeast Iowa by marketing years, 1974-75 through 1978-79, in dollars per bushel

Marketing year	Three months storage		Six months storage		Eight months storage[a]	
(Oct. - Sept.)	Hedged	Unhedged	Hedged	Unhedged	Hedged	Unhedged
1974-75	$ .36	$-.13	$ .48	$-.42	$ .45	$-.33
1975-76	.22	.05	.39	.15	.37	.41
1976-77	.28	.28	.43	.30	.40	-.03
1977-78	.31	.30	.25	.48	.36	.60
1978-79	.18	.14	.26	.35	.14	.62
Average gross return	$ .270	$ .128	$ .362	$ .172	$ .344	$ .254
Range of returns[b]	$ .18	$ .41	$ .23	$ .90	$ .31	$ .95

[a]This alternative involves storage into late June. In years when the peak harvest period occurred in November, slightly less than eight months' storage was involved.

[b]Range from highest return to lowest return per bushel over the time period presented here.

price reporting districts. Hedging returns were calculated by taking the difference between the basis under July futures at the peak harvest period and the basis under July futures at the time the hedge was lifted. The unhedged returns were calculated by taking the difference in the cash prices available at peak harvest and at the time the hedge was lifted.

Looking at the Northwest and Southeast districts, average hedging returns were moderately above unhedged returns. For example, in Northwest Iowa for each of the three storage periods, the average storage hedging returns were 22 to 24 cents above unhedged returns. Southeast Iowa shows a 9 to 18 cent advantage of hedged over unhedged returns. Year-to-year variability was measured by the range between the highest and lowest return over the five marketing years. Variability of hedging returns during all three storage periods was less than the variability of returns associated with unhedged storage. For instance, in Northwest Iowa as shown in Table 5-2, variability of returns from hedging was 50 to 116 cents lower than returns from unhedged storage. In Southeast Iowa, the difference ranged from 23 to 67 cents. These results indicate a producer could have increased average price and decreased variability of returns through hedging as compared to storing unhedged corn.

It should be noted that four of the last five years studied have been characterized by increasing carryover stocks, large crops, and inadequate transportation and storage space. These conditions tend to cause a wide basis at harvest, thus increasing the potential returns available from hedging. Returns from hedging might be lower than unhedged storage in years of declining carryover stocks.

Both the hedging returns and the unhedged returns for all three storage periods for Southeast Iowa were slightly larger than Northwest Iowa. This may be due partly to differences in modes of transportation used.

The variability of the hedging returns for the three month period in both districts was less than the two longer storage periods. Also, the year-to-year variability of unhedged returns increased substantially as the length of storage increased.

Corn storage costs and returns

Storage costs as shown in Table 5-4 consist of: interest, shrinkage, drying, storage, handling, and quality deterioration. The largest component in storing for three months is the storage cost incurred in storing the crop either at the elevator or on the farm. For on-farm storage, this component is fixed and need not be considered in the storage decisions once the investment in storage facilities has been made. All other components of storage costs are variable.

The second largest component is the interest cost involved when borrowed funds are used for a longer time in the business than would be necessary if the crop were sold at harvest. If borrowed funds are not used in the business, this component would be the income foregone by not selling the crop and investing the funds to earn interest. The other components are those costs incurred to store the crop beyond

Table 5-4. Typical corn storage costs in Iowa during the 1978-79 marketing year, assuming a harvest time price of $2.15 per bushel[a]

	Three months storage		Six months storage		Eight months storage	
	Off-farm	On-farm	Off-farm	On-farm	Off-farm	On-farm
Interest	5.9	5.9	11.8	11.8	15.8	15.8
Extra shrink	4.2	5.4	4.2	5.4	4.2	5.4
Extra drying	3.0	1.8	3.0	1.8	3.0	1.8
Storage	10.0	10.0	16.0	10.0	20.0	10.0
Extra handling	0.0	1.5	0.0	1.5	0.0	1.5
Quality deterioration and shrink loss (1% on farm)	0.0	0.0	0.0	0.0	0.0	2.2
Total	23.1	24.6	35.0	30.5	43.0	36.7

[a]Source: Unpublished extension materials developed by Robert N. Wisner, Iowa State University Department of Economics.

harvest without spoilage. An additional cost in storing on-farm is the extra handling needed to move the crop in and out of the farm storage facilities. Although costs varied slightly during the period studied here, 1978-79 costs will be used as a general indicator of net returns available for storing and hedging Iowa grain.

Comparisons of the net returns from hedges and the costs of storage for the 1978-79 marketing year are shown in Table 5-5. These comparisons indicate corn that was stored at the elevator for the three month storage hedge provided net returns greater than the two longer periods, although a net loss still occurred. On-farm stored corn received net returns above fixed costs for all three storage periods with the three month storage hedge in the Northwest and six month storage hedges in the Southeast maximizing return over variable costs.

Soybean hedging results

Tables 5-6 and 5-7 show the maximum gross returns available from hedging programs with three and six month storage, and storage into late June. The unhedged storage returns are increases in cash prices during the same periods for both the Northwest and Southeast price reporting districts.

Comparing hedged and unhedged returns, neither program has a consistent price advantage over the other. In Northwest Iowa, average hedged returns were 6 to 43 cents larger than unhedged returns for three and six-month storage while unhedged returns held a 2 cent advantage for eight months storage. Results from Southeast Iowa showed

Table 5-5. Comparison of typical storage costs and gross hedging returns in Iowa during the 1978-79 marketing year[a]

	Three months storage			Six months storage			Eight months storage		
	Costs		Gross	Costs		Gross	Costs		Gross
	Off-farm	On-farm	hedging returns	Off-farm	On-farm	hedging returns	Off-farm	On-farm	hedging returns
Corn:									
Northwest	23.1	24.6	17.0	35.0	30.5	13.0	43.0	36.7	19.0
Southeast	23.1	24.6	18.0	35.0	30.5	26.0	43.0	36.7	14.0
Soybeans:									
Northwest	27.8	28.3	19.0	50.6	45.1	24.0	65.7	62.3	28.0
Southeast	27.8	28.3	8.0	50.6	45.1	18.0	65.7	62.3	18.0

[a]This table represents an abbreviated consolidation of Tables 5-2 through 5-8.

Table 5-6. Gross returns for three, six and eight months' storage of hedged and unhedged soybeans in Northwest Iowa by marketing years, 1974-75 through 1978-79, in dollars per bushel

Marketing year	Three months storage		Six months storage		Eight months storage	
(Oct. - Sept.)	Hedged	Unhedged	Hedged	Unhedged	Hedged	Unhedged
1974-75	$ .45	$-1.53	$ .87	$-1.91	$ .72	$-2.55
1975-76	.32	-.49	.40	-.52	.48	1.31
1976-77	.29	.59	.13	1.91	.48	1.66
1977-78	.26	.59	.15	1.52	.31	1.21
1978-79	.19	.19	.24	.46	.28	.73
Average gross return	$ .302	$-.130	$ .358	$ .292	$ .454	$ .472
Range of returns[a]	$ .27	$2.12	$ .74	$3.82	$ .44	$4.21

[a]This alternative involves storage into late June. In years when the peak harvest period occurred in November, slightly less than eight months' storage was involved.

Table 5-7. Gross returns for three, six and eight months' storage of hedged and unhedged soybeans in Southeast Iowa by marketing years, 1974-75 through 1978-79, in dollars per bushel

Marketing year	Three months storage		Six months storage		Eight months storage	
(Oct. - Sept.)	Hedged	Unhedged	Hedged	Unhedged	Hedged	Unhedged
1974-75	$ .66	$-.94	$ .93	$-1.78	$ .82	$-1.70
1975-76	.40	-.04	.53	-.09	.59	1.79
1976-77	.29	.59	.20	1.98	.39	1.57
1977-78	.28	.61	.29	1.66	.52	1.42
1978-79	.08	.08	.18	.38	.18	.63
Average gross return	$ .342	$ .060	$ .426	$ .430	$ .500	$ .742
Range of returns[a]	$ .58	$1.55	$ .75	$3.76	$ .64	$3.49

[a]This alternative involves storage into late June. In years when the peak harvest period occurred in November, slightly less than eight months' storage was involved.

average hedged returns were 28 cents larger in the three month storage program, unhedged returns held a 24 cent advantage for eight months storage, and the six month storage returns virtually the same.

Variability of returns as measured by the range between the highest and lowest return over the five marketing year period, revealed that hedging returns during all three storage periods varied substantially less than unhedged returns. For example, in Southeast Iowa as shown in Table 5-7, variability of returns from hedging was 97 to 301 cents lower than returns from unhedged storage. In Northwest Iowa the difference ranged from 85 to 377 cents.

Although a producer would have reduced his average return in some types of hedging programs, the reduced variability of returns might be a compensating factor, particularly for the individual with limited financial risk-bearing ability. The individual producer in choosing between hedged and unhedged storage should review his ability to absorb the risk of negative storage returns.

As with corn, both the hedging returns and unhedged returns for all three storage periods for Southeast Iowa were larger than Northwest Iowa possibly due to transportation and market conditions. The variability of the hedging returns for the three month period in both districts was less than the two larger periods. Also, the variability of unhedged returns increased substantially from three to six months, then increased further for eight months storage in Northwest Iowa, but decreased slightly in Southeast Iowa.

Soybean costs and returns

Soybean storage costs as shown in Table 5-8 consist of: interest, storage, handling, and quality deterioration. The largest component in storing soybeans is the interest cost. Interest costs ranged from 17 cents per bushel for three months storage to 45 cents per bushel for eight months storage. The second largest component is the storage cost incurred in storing the crop either at the elevator or on the farm. For on-farm storage, this component is fixed. All other costs are variable. Handling costs and quality deterioration are explained in a previous section.

Comparisons of the net returns from hedges and the costs of storage for the 1978-79 marketing year are shown in Table 5-5. These comparisons indicate soybeans that were stored at the elevator for the three month storage hedge provided net returns greater than the two longer periods, although a net loss still occurred. With the exception of the three month storage hedge in the Southeast, all hedging program returns covered fixed costs for on-farm stored soybeans. The three month storage hedge in both districts maximized returns over variable costs and minimized net losses.

Implications for Producer Marketing Strategies

Hedging offered a potentially important role for producers in marketing stored corn during the 1974-79 period. It would have generated increased returns and decreased variability compared to unhedged returns. Hedging offered a less important potential role in marketing soybeans. In this case, returns were limited in several

Table 5-8. Typical soybean storage costs in Iowa during the 1978-79 marketing year, assuming a harvest-time price of $6.10 per bushel[a]

	Three months storage		Six months storage		Eight months storage	
	Off-farm	On-farm	Off-farm	On-farm	Off-farm	On-farm
Interest	16.8	16.8	33.6	33.6	44.7	44.7
Storage	11.0	10.0	17.0	10.0	21.0	10.0
Extra handling	0.0	1.5	0.0	1.5	0.0	1.5
Quality deterioration and shrink loss (1% on-farm)	0.0	0.0	0.0	0.0	0.0	6.1
Total	27.8	28.3	50.6	45.1	65.7	62.3

[a]Source: Unpublished extension materials developed by Robert N. Wisner, Iowa State University Department of Economics.

instances with hedging returns being less than those from unhedged storage. However, variability from hedging returns was substantially less than unhedged storage and could be an important consideration for farm operators with limited risk-bearing ability.

It is important to note that if the costs of storage incurred in the 1978-79 marketing year were typical throughout the 1974-79 period, hedging returns generally would not cover the full costs of storing corn and soybeans for the time periods studied here. The next chapter deals with new crop pricing results including preharvest hedging and forward contracting.

CHAPTER VI. NEW CROP PRICING

As mentioned in Chapter 2, forward contracting is accomplished when a producer enters into a written agreement with an elevator locking in a negotiated price for delivery of a specified product at some specified future time. Forward contracting alternatives analyzed here are those which involve locking in of a price for harvest delivery.

An alternative new crop pricing method involves use of a preharvest hedge. Preharvest hedging is accomplished by selling futures contracts during the growing season. When the producer harvests his crops, he then simultaneously sells his cash crop and buys back his futures commitment. A loss from a decrease in cash prices during the hedging period will be about offset by a gain in futures prices and vice versa.

New Crop Basis

In choosing between these two new crop pricing methods, it is first essential to analyze the new crop basis. The new crop basis can be defined as the difference between the local cash price at harvest and the December futures price for corn, or the November futures price for soybeans on any given day. New crop contracting bids for harvest delivery are published daily by the Marketing Division of the Iowa Department of Agriculture, generally from mid-spring or early summer through September. The basis used in these bids reflects expectations of the grain trade as to what the local and national market conditions will be at harvest.

New crop bids were first reported by the Marketing Division by

Iowa districts in 1976; thus only four years of contracting prices were available for this study. Information on new crop basis patterns is essential to producers in deciding whether to forward contract with an elevator, use preharvest hedging on one of the commodity exchanges or cash sell at harvest. As a framework for decision making, the basis on forward contracts versus the likely basis and timing of seasonal price movements for both hedging and contracting will be examined here. In general, forward contracting would be more advantageous than hedging if the basis in such contracts is smaller than the expected harvest-time basis.

New crop basis patterns are listed in Figures 6-1 through 6-8 and Tables 6-1 and 6-2 for the Northwest and Southeast districts for the 1976-79 period. These data show the new crop basis in forward contracts until harvest begins, and the cash basis under the December and November futures for corn and soybeans respectively, from harvest-time until the expiration of the futures contracts. Tables 6-3 through 6-6 show comparisons of prices received from forward contracts for harvest delivery and preharvest hedges during early June, mid-July, mid-August, and mid-September, and the average harvest prices received for the period 1976 through 1979 for Northwest and Southeast Iowa.

New Crop Corn Pricing Results

Comparisons of forward contracting, preharvest hedging and harvest-time corn sales are presented in Tables 6-3 and 6-4. Comparing average returns from contracting to those received from hedging, note that average contracting prices were within 1 to 3 cents per bushel of the

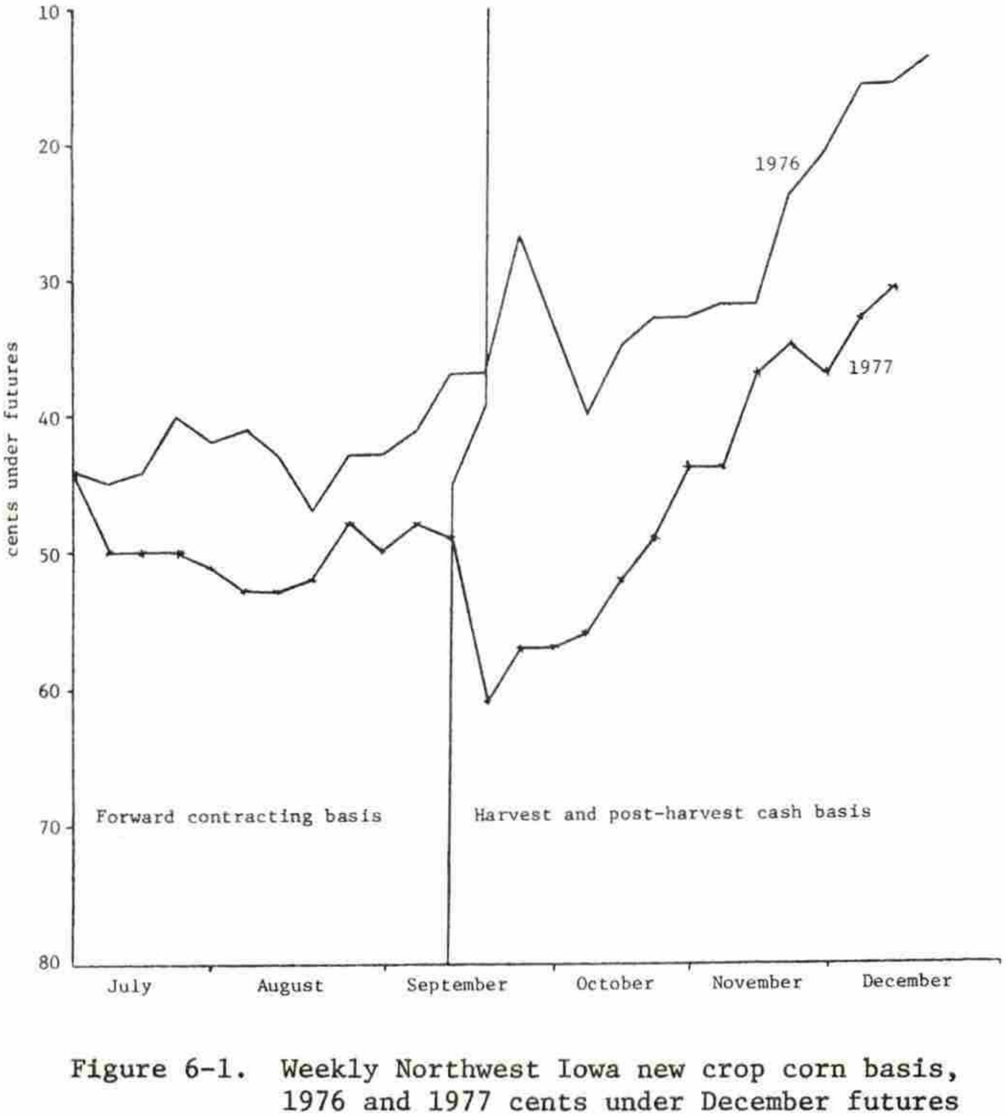

Figure 6-1. Weekly Northwest Iowa new crop corn basis, 1976 and 1977 cents under December futures

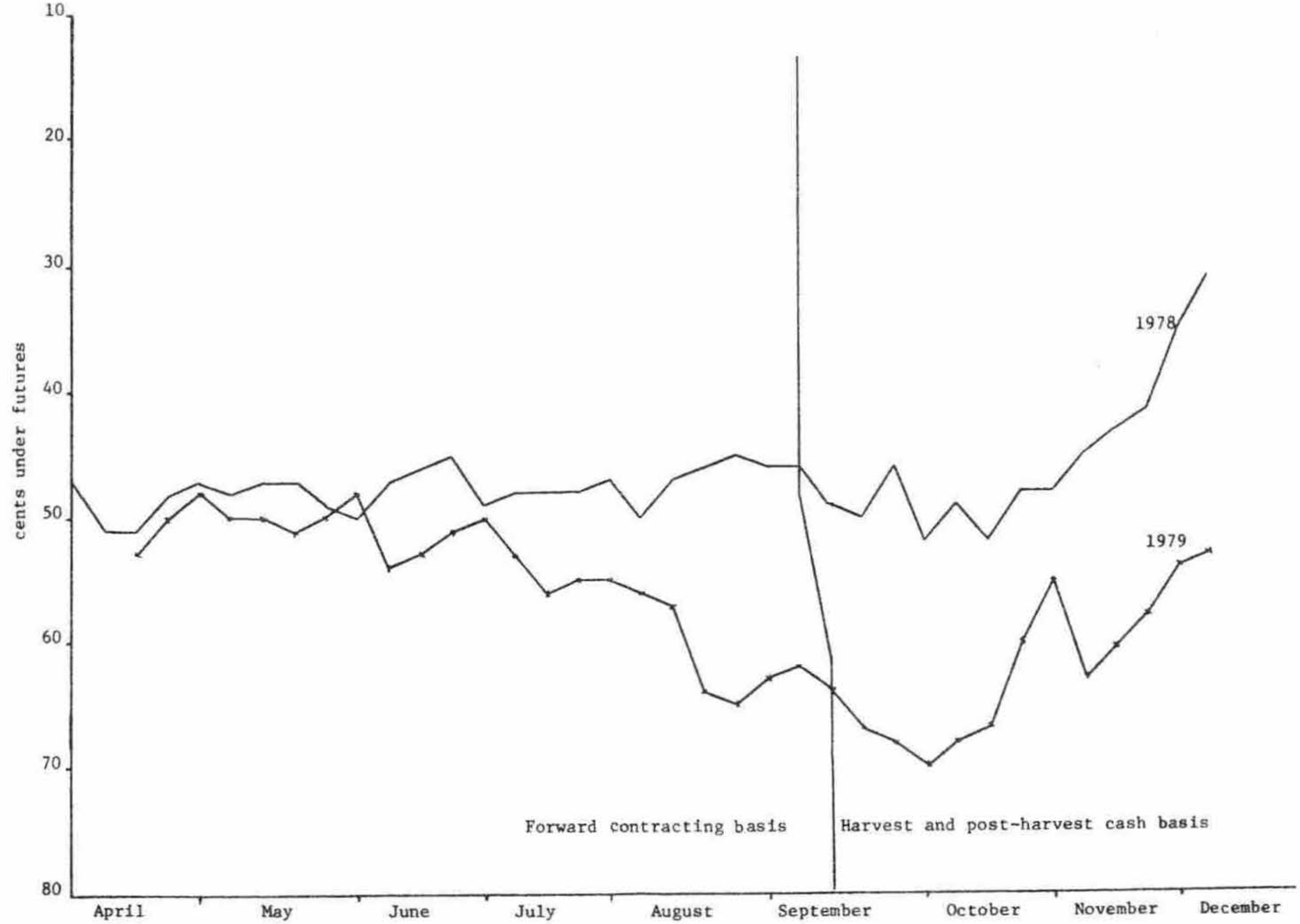

Figure 6-2. Weekly Northwest Iowa new crop corn basis, 1978 and 1979 cents under December futures

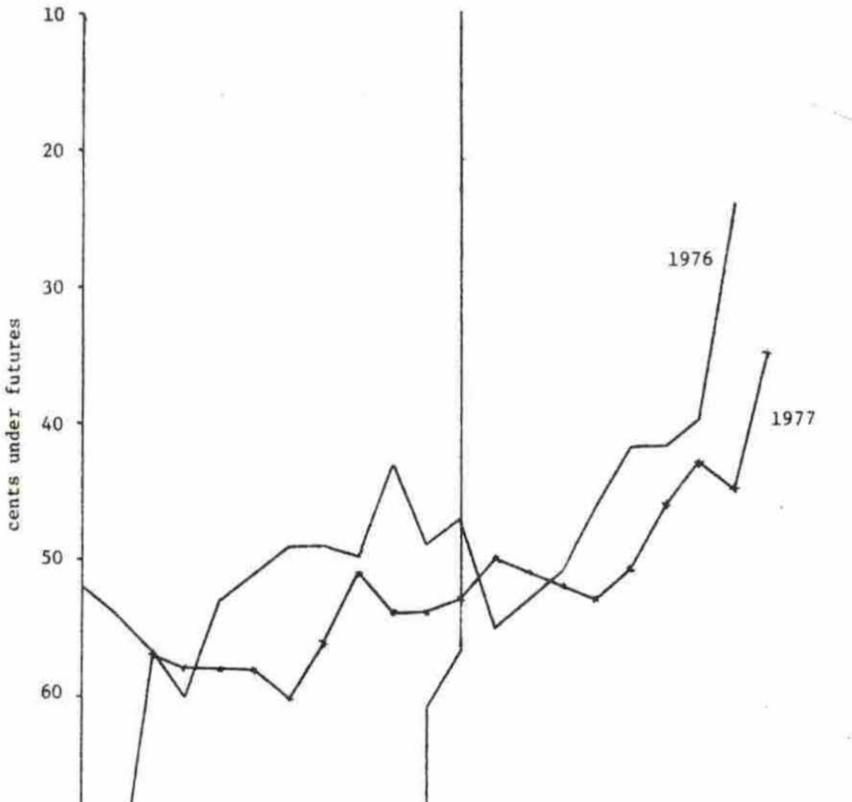

Figure 6-3. Weekly Northwest Iowa new crop soybean basis, 1976 and 1977 cents under November futures

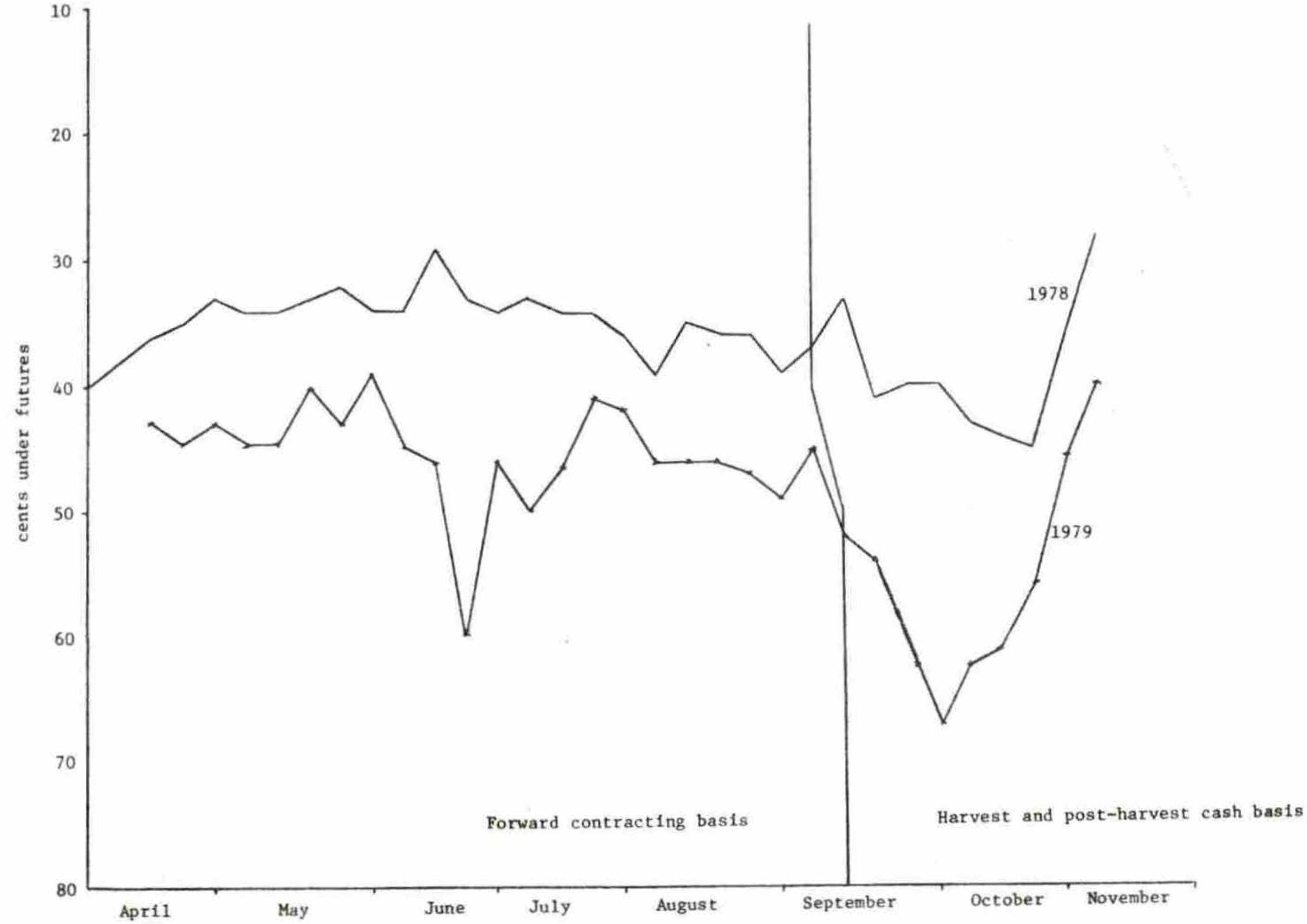

Figure 6-4. Weekly Northwest Iowa new crop soybean basis, 1978 and 1979 cents under November futures

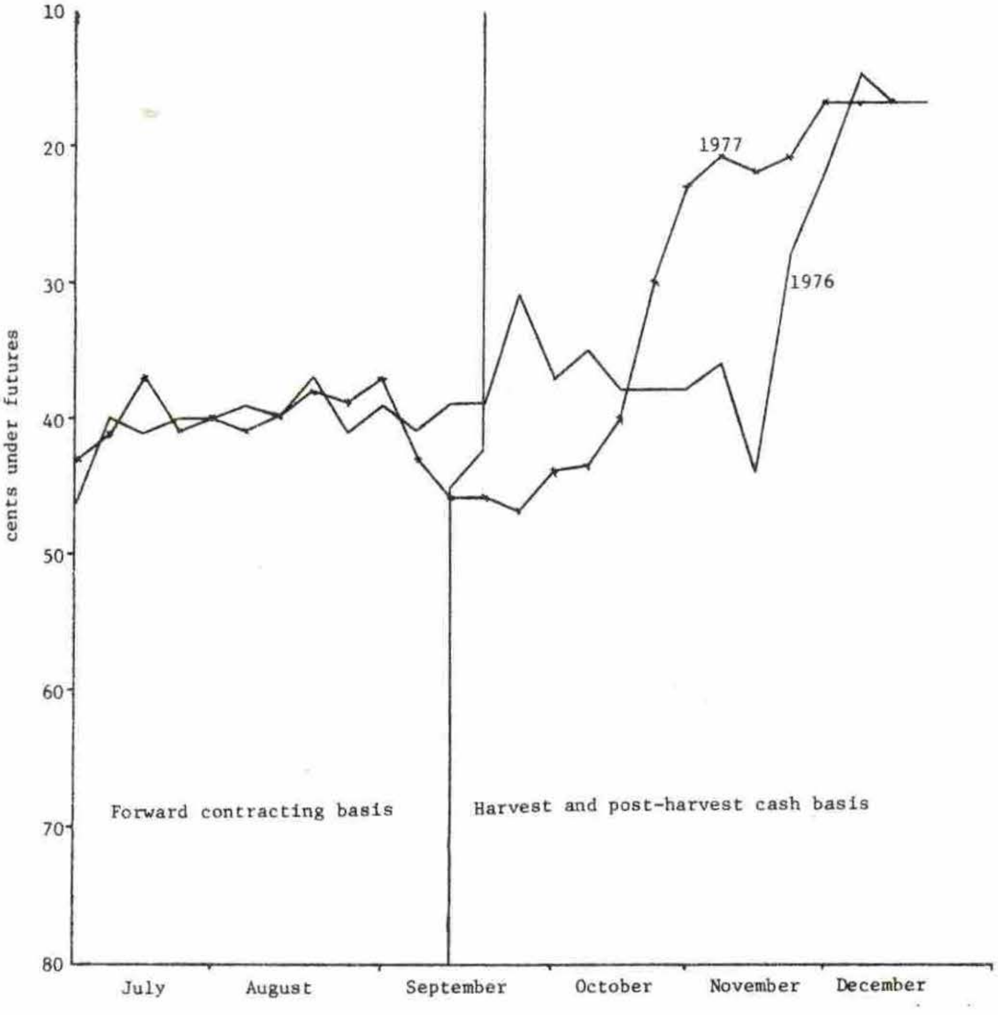

Figure 6-5. Weekly Southeast Iowa new crop corn basis, 1976 and 1977 cents under December futures

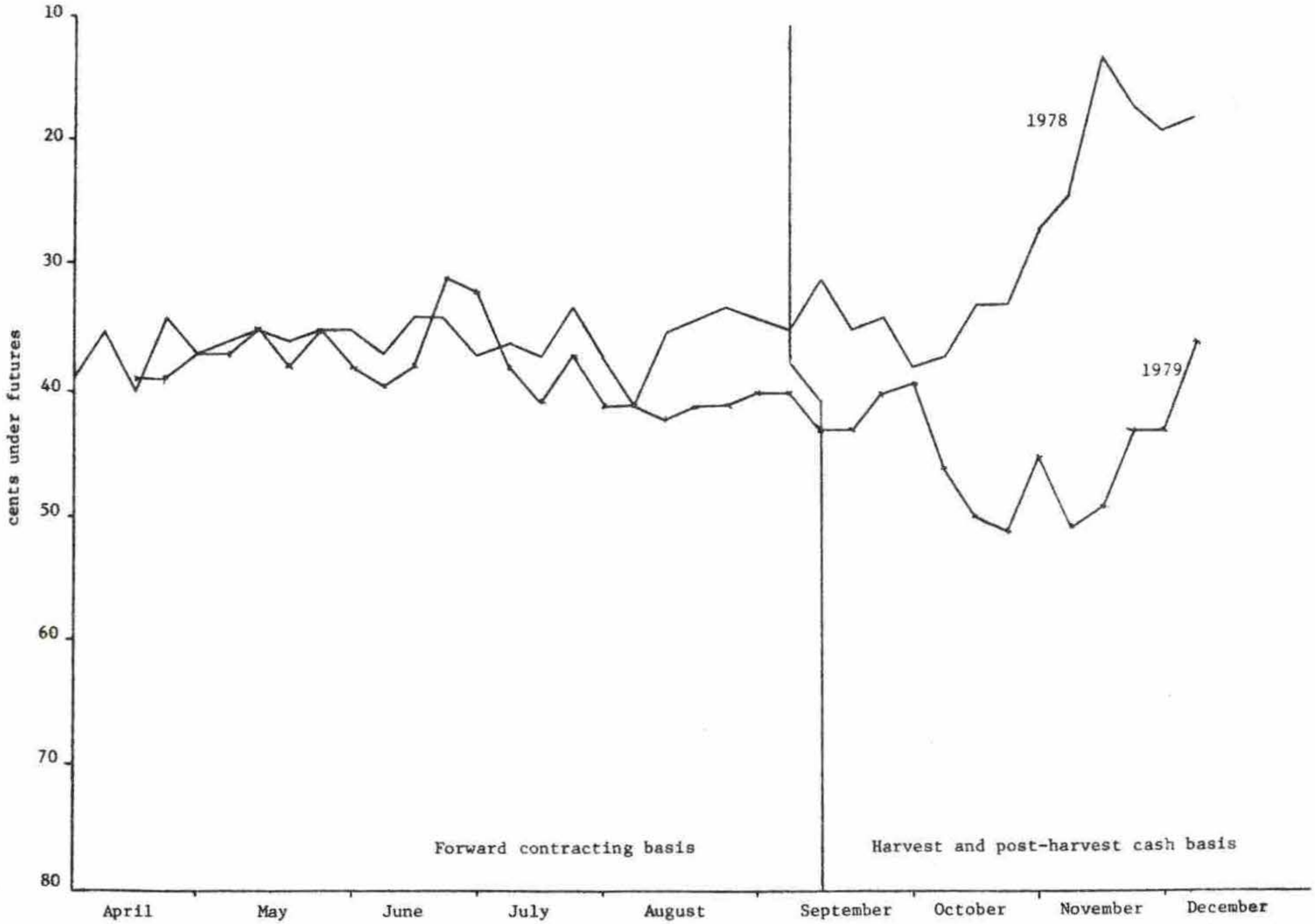

Figure 6-6. Weekly Southeast Iowa new crop corn basis, 1978 and 1979 cents under December futures

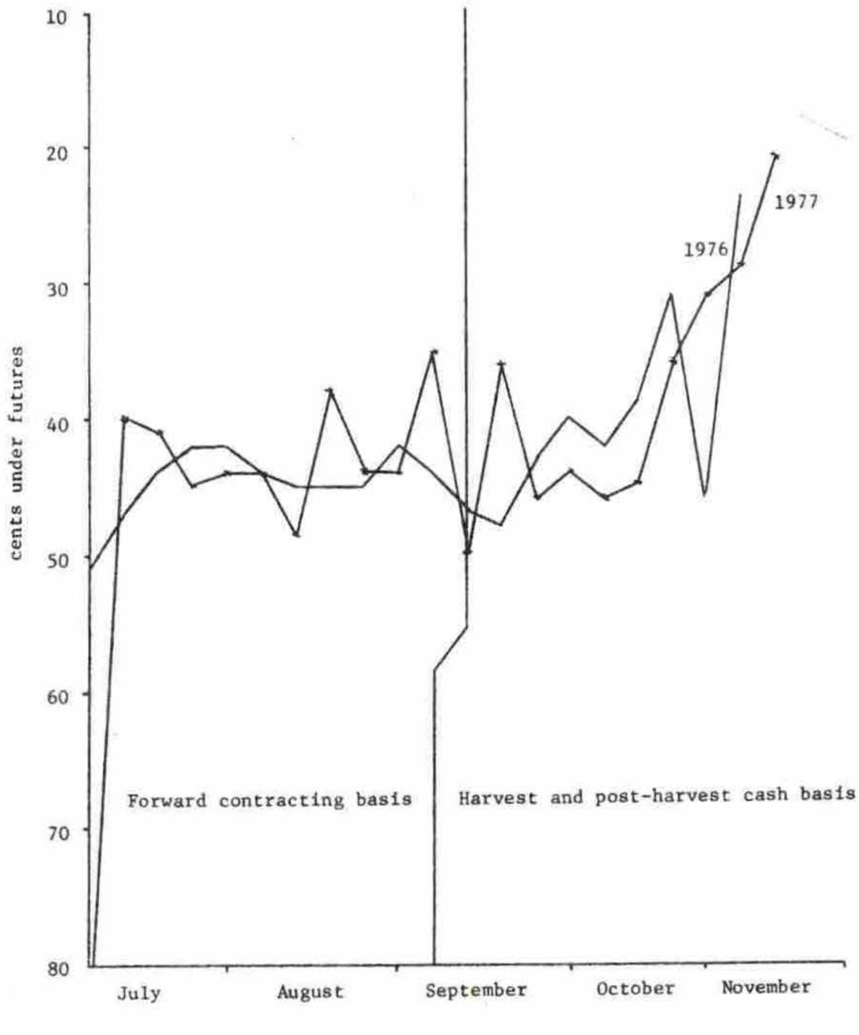

Figure 6-7. Weekly Southeast Iowa new crop soybean basis, 1976 and 1977 cents under November futures

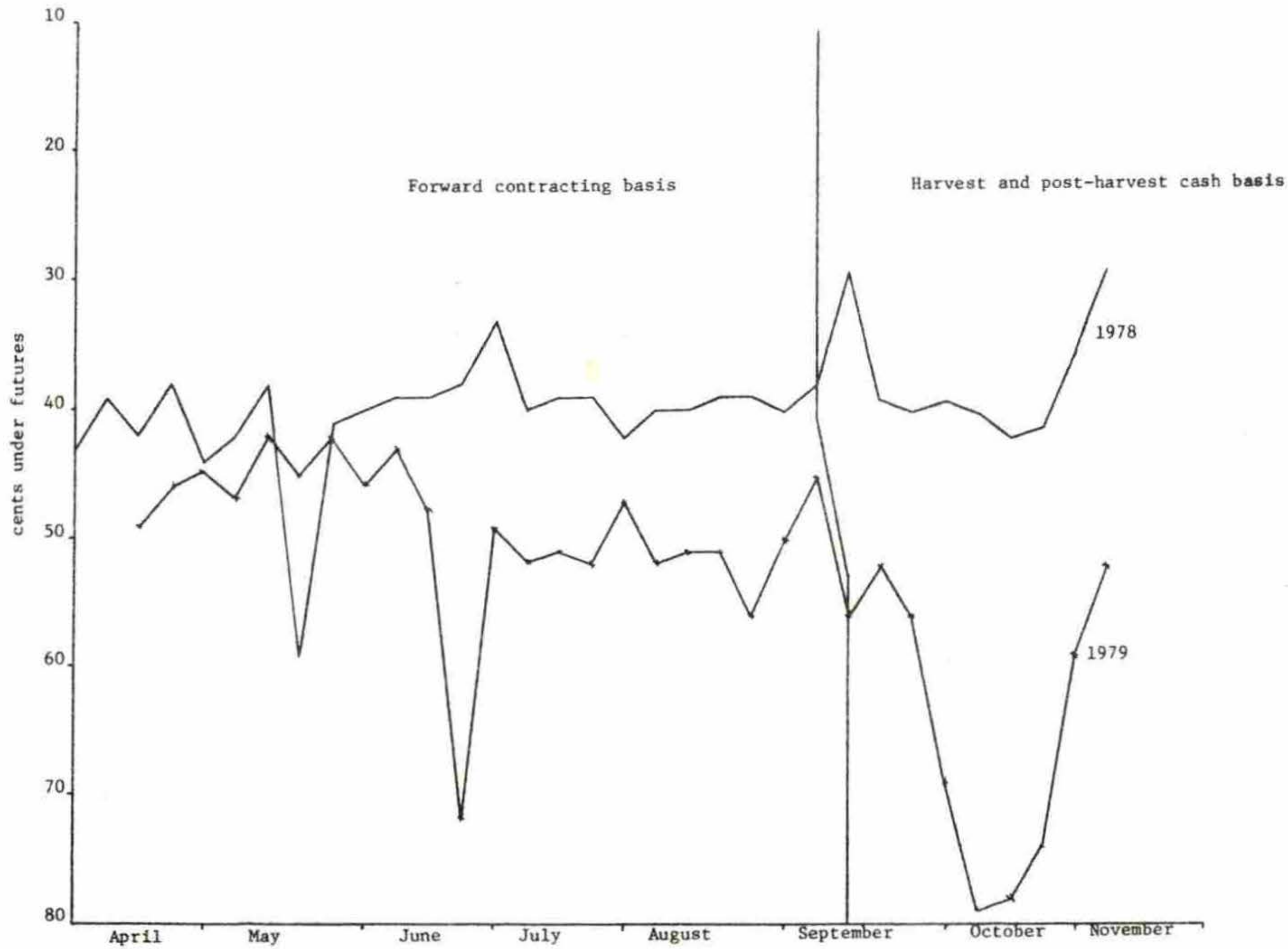

Figure 6-8. Weekly Southeast Iowa new crop soybean basis, 1978 and 1979 cents under November futures

Table 6-1. Weekly Northwest Iowa new crop basis, 1976-79[a]

Year	Month and week		Corn (Dec. basis)	Soybeans (Nov. basis)
1976:	July	1	44	52
		2	45	54
		3	44	57
		4	40	60
		5	42	53
	Aug.	1	41	51
		2	43	49
		3	47	49
		4	43	50
	Sept.	1	43	43
		2	41	49
		3	37	40
		4	37	47
		5	33	55
	Oct.	1	40	53
		2	35	51
		3	33	46
		4	33	42
	Nov.	1	32	42
		2	32	40
		3	24	24
		4	21	--[b]
1977:	June	5	44	73
	July	1	50	75
		2	50	57
		3	50	58
		4	51	58
	Aug.	1	53	58
		2	53	63
		3	52	56
		4	48	51

[a]New crop basis figures were obtained from Robert N. Wisner, Craig A. Chase, and H. Alan Carver, Basis Patterns for Corn and Soybeans, Iowa State University, Ames, Iowa, Cooperative Extension Service, M-1213, May 1980.

[b]Current year November futures contracts have expired prior to this time.

Table 6-1. (Continued)

Year	Month and week		Corn (Dec. basis)	Soybeans (Nov. basis)
1977:	Sept.	1	50	54
		2	48	54
		3	49	53
		4	61	50
		5	57	51
	Oct.	1	57	52
		2	56	53
		3	52	51
		4	49	46
	Nov.	1	44	43
		2	44	45
		3	37	35
		4	35	--[b]
1978:	Apr.	1	47	60
		2	51	58
		3	51	56
		4	48	55
	May	1	47	53
		2	48	54
		3	47	54
		4	47	53
	June	1	49	52
		2	50	54
		3	47	54
		4	46	49
		5	45	53
	July	1	49	54
		2	48	53
		3	48	54
		4	48	54
	Aug.	1	47	56
		2	50	59
		3	47	55
		4	46	56
		5	45	56
	Sept.	1	46	59
		2	46	57
		3	49	53
		4	50	61

Table 6-1. (Continued)

Year	Month and week		Corn (Dec. basis)	Soybeans (Nov. basis)
1978:	Oct.	1	46	60
		2	52	60
		3	49	63
		4	52	64
	Nov.	1	48	65
		2	48	56
		3	45	48
		4	43	--[b]
		5	42	--[b]
1979:	Apr.	3	53	63
		4	50	64
	May	1	48	63
		2	50	64
		3	50	64
		4	51	60
		5	50	63
	June	1	48	59
		2	54	65
		3	53	66
		4	51	80
	July	1	50	66
		2	53	70
		3	56	67
		4	55	61
	Aug.	1	55	62
		2	56	66
		3	57	66
		4	64	66
		5	65	67
	Sept.	1	63	69
		2	62	65
		3	64	72
		4	67	74
	Oct.	1	68	80
		2	70	87
		3	68	82
		4	67	81
	Nov.	1	60	76
		2	55	66
		3	63	60
		4	61	--[b]
		5	58	--[b]

Table 6-2. Weekly Southeast Iowa new crop basis, 1976-79[a]

Year	Month and week		Corn (Dec. basis)	Soybean (Nov. basis)
1976:	July	1	46	51
		2	40	47
		3	41	44
		4	40	42
		5	40	42
	Aug.	1	39	44
		2	40	45
		3	37	45
		4	41	45
	Sept.	1	39	42
		2	41	44
		3	49	32
		4	39	47
		5	37	48
	Oct.	1	35	43
		2	38	40
		3	38	42
		4	38	39
	Nov.	1	36	31
		2	44	46
		3	28	24
		4	22	--[b]
1977:	June	5	43	83
	July	1	41	40
		2	37	41
		3	41	45
		4	40	44
	Aug.	1	41	44
		2	40	49
		3	38	38
		4	39	44

[a]New crop basis figures were obtained from Robert N. Wisner, Craig A. Chase, and H. Alan Carver, Basis Patterns for Corn and Soybeans, Iowa State University, Ames, Iowa, Cooperative Extension Service, M-1210, May 1980.

[b]Current year November futures contracts have expired prior to this time.

Table 6-2. (Continued)

Year	Month and week		Corn (Dec. basis)	Soybeans (Nov. basis)
1977:	Sept.	1	37	44
		2	43	35
		3	46	50
		4	46	36
		5	47	46
	Oct.	1	44	44
		2	44	46
		3	40	45
		4	30	36
	Nov.	1	23	31
		2	21	29
		3	22	21
		4	21	--[b]
1978:	Apr.	1	39	43
		2	35	39
		3	40	42
		4	34	38
	May	1	37	44
		2	36	42
		3	35	38
		4	36	59
	June	1	35	41
		2	35	40
		3	37	39
		4	34	39
		5	34	38
	July	1	37	33
		2	36	40
		3	37	39
		4	33	39
	Aug.	1	37	42
		2	41	40
		3	35	40
		4	34	39
		5	33	39
	Sept.	1	34	40
		2	35	38
		3	31	29
		4	35	39

Table 6-2. (Continued)

Year	Month and week		Corn (Dec. basis)	Soybeans (Nov. basis)
1978:	Oct.	1	34	40
		2	38	39
		3	37	40
		4	33	42
	Nov.	1	33	41
		2	27	35
		3	24	29
		4	13	--[b]
		5	17	--[b]
1979:	Apr.	3	39	49
		4	39	46
	May	1	37	45
		2	37	47
		3	35	42
		4	38	45
		5	35	42
	June	1	38	46
		2	39	43
		3	38	48
		4	31	72
	July	1	32	49
		2	38	52
		3	41	51
		4	37	52
	Aug.	1	41	47
		2	41	52
		3	42	51
		4	41	51
		5	41	56
	Sept.	1	40	50
		2	40	45
		3	43	56
		4	43	52
	Oct.	1	40	56
		2	39	69
		3	46	79
		4	50	78
	Nov.	1	51	74
		2	45	59
		3	51	52
		4	49	--[b]
		5	43	--[b]

Table 6-3. Comparisons of results from pricing new crop corn during summer months for harvest delivery by direct use of the futures market and through local elevator contracts in the Northwest Price Reporting District, 1976-79

Year	Elevator contracts				Hedges in December futures[a]				Unhedged harvest price
	Early June	Mid-July	Mid-Aug.	Mid-Sept.	Early June	Mid-July	Mid-Aug.	Mid-Sept.	(Oct.-Nov. average)
1976	--[b]	2.45	2.25	2.54	2.39	2.56	2.35	2.61	2.24
1977	--[b]	1.77	1.52	1.53	2.05	1.77	1.55	1.51	1.68
1978	2.20	1.96	1.75	1.76	2.20	1.95	1.76	1.72	1.83
1979	2.32	2.60	2.22	2.22	2.12	2.47	2.13	2.18	2.09
Average price	2.26	2.20	1.94	2.01	2.19	2.19	1.95	2.01	1.96
Range of prices[c]	.12	.83	.73	1.01	.34	.79	.80	1.10	.56

[a]Hedging prices include a two-cent per bushel deduction to cover expenses of futures trading.

[b]Contracting prices not reported.

[c]Range from highest to lowest price over the four year period.

Table 6-4. Comparisons of results from pricing new crop corn during summer months for harvest delivery by direct use of the futures market and through local elevator contracts in the Southeast Price Reporting District, 1976-79

Year	Elevator contracts				Hedges in December futures[a]				Unhedged harvest price
	Early June	Mid-July	Mid-Aug.	Mid-Sept.	Early June	Mid-July	Mid-Aug.	Mid-Sept.	(Oct.-Nov. average)
1976	--[b]	2.49	2.28	2.54	2.35	2.52	2.31	2.57	2.20
1977	--[b]	1.90	1.64	1.57	2.21	1.93	1.71	1.67	1.84
1978	2.34	2.08	1.85	1.86	2.39	2.14	1.95	1.91	2.02
1979	2.42	2.75	2.37	2.43	2.29	2.64	2.30	2.35	2.26
Average price	2.38	2.31	2.04	2.10	2.31	2.31	2.07	2.13	2.08
Range of prices[c]	.08	.85	.73	.97	.18	.71	.60	.90	.42

[a]Hedging prices include a two-cent per bushel deduction to cover expenses of futures trading.

[b]Contracting prices not reported.

[c]Range from highest to lowest price over the four year period.

price obtained through hedging in the futures market. One exception was in early June with hedged prices reflecting a four year average whereas contracted prices were determined by using a two year average. Thus, these results are not directly comparable. The reason for the two year contracting average is that in 1976 and 1977 new crop bids were first reported beginning in the last week of June. Early June contracting prices thus were not available for the two earlier years. Hedging returns shown here are net returns after deducting hedging costs of 2 and 4 cents per bushel respectively for corn and soybeans.

Hedging prices were generally above prices received from forward contracting during the first three years of the period under study for Southeast Iowa, whereas the prices received from the two alternatives in Northwest Iowa were nearly identical. In 1979, the opposite pattern occurred, with forward contracting receiving a 4 to 20 cent per bushel advantage over hedging. Likely reasons for the advantage of contracting in 1979 were the Rock Island railroad strike during early fall and larger than expected corn and soybean crops. These conditions produced a larger than normal basis at harvest which was not anticipated when forward contracts were issued in early spring and summer. The result was that forward contracts offered unusually attractive pricing opportunities in the spring and early summer, relative to other market alternatives.

Elevator contracting or new crop hedging in early June and mid-July would have provided higher prices than harvest-time cash bids for each of the four study years. For example, in Northwest Iowa hedging and contracting held a 3 to 51 cents per bushel advantage over harvest-time prices while an advantage of 3 to 49 cents occurred in Southeastern Iowa.

Mid-August and mid-September results from new crop pricing show a slight and moderate price advantage over harvest-time prices respectively during 1976 and 1979. These alternatives provided a moderate disadvantage during 1977 and 1978 in both districts. Whether or not similar monthly price patterns occur in future years depends upon the level of carryover stocks and on crop prospects during the summer.

Variation in corn prices

The variation in returns from hedging and forward contracting in early June was lower than in the corresponding prices received during harvest-time. For example, Northwest Iowa harvest prices ranged from $1.68 to $2.24 over the 1976-79 period, while preharvest hedging and forward contracting prices ranged from $2.05 to $2.39 and $2.20 to $2.32 respectively for the same period. Thus, early June preharvest hedges and forward contracts not only were less variable, but also offered a higher average return than harvest sales.

Hedging or contracting during the past four years in mid-July, mid-August, or mid-September resulted in substantially higher variation in prices than harvest sales. For instance, harvest time prices in Northwest Iowa varied by 56 cents per bushel over this period, while contracts and hedges provided a price range of 73 cents and 110 cents, respectively. Thus, hedging or contracting initiated early in the growing season resulted in increased average prices and decreased variability in prices over those received at harvest. These advantages, however, decreased substantially as the pricing decision was delayed until later in the growing season.

New Crop Soybean Pricing Results

Results from forward contracting, preharvest hedging, and harvest-time soybean sales are shown in Tables 6-5 and 6-6. Note that for all four alternatives, average forward contracting prices were above the prices received from hedging by 5 to 13 cents per bushel.

Looking at the individual years, forward contracting and hedging returns were nearly identical in 1976 in Northwest Iowa. However, as the study period progressed from 1977 to 1979, forward contracting's advantage moderately increased. In Southeast Iowa, hedging and contracting prices were nearly identical in 1976 with hedging returns receiving a 3 to 6 cents per bushel advantage over contracting in 1977. The opposite occurred in 1978 and 1979 with forward contracting providing an advantage for all four marketing alternatives.

During early summer and mid-September, hedging or contracting would have given the producer moderately higher returns than harvest-time sales. The opposite would have occurred in mid-August, with harvest-time sales having a slight advantage over hedging or contracting.

Variation in soybean prices

Comparing the year-to-year variation in hedging and contracting prices, hedging results in early summer were more variable than the

Table 6-5. Comparisons of results from pricing new crop soybeans during summer months for harvest delivery by direct use of the futures market and through local elevator contracts in the Northwest Price Reporting District, 1976-79

Year	Elevator contracts				Hedges in November futures[a]				Unhedged harvest price
	Early June	Mid-July	Mid-Aug.	Mid-Sept.	Early June	Mid-July	Mid-Aug.	Mid-Sept.	(Oct.-Nov. average)
1976	--[b]	6.96	5.90	6.94	5.37	6.98	5.87	6.90	5.95
1977	--[b]	5.71	4.83	4.60	7.14	5.74	4.92	4.60	4.74
1978	6.17	5.67	5.42	6.02	6.03	5.55	5.36	5.93	6.23
1979	6.86	6.83	6.38	6.70	6.58	6.65	6.17	6.48	5.93
Average price	6.52	6.29	5.63	6.07	6.28	6.23	5.58	5.98	5.72
Range of prices[c]	.69	1.29	1.55	2.34	1.77	1.43	.95	2.30	1.45

[a]Hedging prices include a four-cent per bushel deduction to cover expenses of futures trading.

[b]Contracting prices not reported.

[c]Range from highest to lowest price over the four year period.

Table 6-6. Comparisons of results from pricing new crop soybeans during summer months for harvest delivery by direct use of the futures market and through local elevator contracts in the Southeast Price Reporting District, 1976-79

	Elevator contracts				Hedges in November futures[a]				Unhedged harvest price
Year	Early June	Mid-July	Mid-Aug.	Mid-Sept.	Early June	Mid-July	Mid-Aug.	Mid-Sept.	(Oct.-Nov. average)
1976	--[b]	7.04	5.94	6.99	5.44	7.05	5.94	6.97	6.02
1977	--[b]	5.88	4.97	4.80	7.22	5.82	5.00	4.68	4.86
1978	6.28	5.80	5.62	6.20	6.24	5.76	5.57	6.14	6.44
1979	7.00	7.00	6.53	6.91	6.70	6.77	6.29	6.60	6.05
Average price	6.64	6.43	5.77	6.23	6.40	6.35	5.70	6.10	5.84
Range of prices[c]	.72	1.24	1.56	2.19	1.78	1.29	.94	2.29	1.58

[a] Hedging prices include a four-cent per bushel deduction to cover expenses to futures trading.

[b] Contracting prices not reported.

[c] Range from highest to lowest price over the four year period.

corresponding forward contracting results. During mid-August, the opposite occurred with hedging returns being moderately less variable than those for forward contracting. The mid-September comparisons reveal that returns from the two marketing alternatives were nearly identical in degree of price variation.

When comparing year-to-year variation of contracting and hedging returns to harvest-time sales, hedging in mid-July and mid-August for both Northwest and Southeast Iowa would have reduced variability over the returns received at harvest-time. However, increased variation would have occurred in early June and mid-September hedging alternatives compared to harvest-time sales.

In Southeast Iowa, forward contracting in early June and mid-July would have reduced year-to-year variations in returns, with mid-August results being nearly identical to harvest-time sales and mid-September results showing increasing variability. In Northwest Iowa, contracting would have reduced variability in early June and mid-July while increased variability occurred during mid-August and mid-September marketing times.

Whether these patterns continue depends upon summer weather conditions and crop prospects. For example, if the growing season looks favorable, the monthly patterns of new-crop prices will likely continue to be similar to the average pattern shown in this analysis for the past four years. If growing conditions are adverse, the late summer and early fall forward prices could be more attractive than those available in June and July.

It is important to note that other factors such as local supply, demand and transportation capabilities also will affect prices received at harvest. For instance, if a serious rail car shortage exists, the local basis will likely become wider than normal and will tend to reduce the net return to the producer from both pre-harvest hedging and harvest sales. However, if the local demand exceeds the local supply, the basis will narrow and return more to the producer through hedging than normally would be expected.

Timing also is essential to maximizing profits. For example, the producer should be alert to weather patterns across the grain belt in any given year and normal seasonal price patterns in deciding when to enter into a forward contract or to place a hedge.

Role of New Crop Pricing in Corn and Soybeans

New crop pricing offered a potentially important role for producers in marketing corn and soybeans during the 1974-79 period. For corn, hedging or contracting initiated in early June and mid-July resulted in increased prices over those received at harvest during all four years of the study period. As the growing season progressed until after mid-summer, the results became mixed with hedging and contracting prices larger or smaller than the corresponding average harvest prices, depending upon local and national market conditions.

Variability of prices in early June were lower than the corresponding range of harvest prices. However, from mid-July through the harvest period increased variability occurred, possibly limiting some farm operators with limited risk-bearing ability from using these techniques.

New crop pricing of soybeans in early June, mid-July, and mid-September would have provided average returns above prices received at harvest. However, mid-August returns averaged slightly lower. Year-to-year variability of forward contracting returns increased moderately as the growing season progressed and the pricing decision was delayed. Hedging returns decreased moderately from early-June to mid-August, then increased substantially in mid-September.

Chapter 7 summarizes the findings of this thesis and highlights the important results and implications of the marketing alternatives studied.

CHAPTER VII. SUMMARY AND CONCLUSIONS

Overview

The main objectives of the thesis were: (1) to assist Iowa producers in more effectively marketing corn and soybeans by analyzing four marketing alternatives available to them; (2) to compare the returns available to producers in the Northwest and Southeast price reporting districts from using these marketing alternatives; and (3) to examine the behavior of Chicago corn and soybean futures markets as contract expiration is approached. The four marketing alternatives examined here were: cash sale at harvest, forward contracting through a local elevator for delivery at harvest, use of futures markets to establish prices for harvest and post-harvest delivery, and storage of the crop beyond harvest without forward pricing.

Transportation and market conditions were expected to cause important differences between the cash-futures price relationships of the two price reporting districts. These differences were believed likely to affect the net returns available from various marketing alternatives. Conditions in the Chicago markets also may influence local basis patterns and returns to producers from various forward pricing alternatives at certain times.

Spatial Price Relationships and Delivery Conditions

Regional price differentials for grains and oilseeds reflect a pricing system that takes into account transfer costs. In the case of corn and soybeans, Chicago is the par delivery point for corn and soybean futures contracts and forms a common reference point from which local prices can be related. Delivery or potential delivery on futures contracts is an important mechanism which holds local cash prices in a predictable relationship to Chicago. In analyzing district price differences, it was found that under normal conditions, delivery on CBOT or MAE corn and soybean futures contracts at Chicago would be more economical than delivery to either St. Louis (corn only) or Toledo, Ohio. Also, rail delivery was found to be more economical than truck delivery.

In analyzing the effectiveness of the delivery mechanism, the weekly Northwest and Southeast Iowa corn and soybean basis for the 1974-79 period was compared with the corresponding cost of delivery on Chicago futures contracts (on delivery cost basis). At no time in either district did the average actual corn basis under expiring futures contracts during the futures delivery month exceed the delivery cost basis. In fact, the corn basis generally was smaller than would be expected from examining delivery costs. In soybeans, however, in August and November 1974 and in May 1978 the average soybean basis did modestly exceed the average delivery cost basis. These results indicate that in essentially all cases, there was no incentive for a hedger to deliver corn from Northwest and Southeast Iowa on futures contracts. However, on a few occasions, incentives for delivery of Iowa soybeans on futures contracts did briefly occur. But in these instances and with a volatile soybean basis, delivery could have been accomplished more effectively by firms owning soybeans in Chicago than by Iowa hedgers. Based on these findings, it is concluded that delivery costs do set a lower limit on corn and in most cases, on the Iowa soybean basis.

Chicago Basis as an Indicator of Delivery Conditions

Chicago basis patterns were examined to determine if delivery conditions have at times contributed to erratic basis behavior in Iowa as futures contracts expire. If delivery on futures contracts is possible or the threat of delivery is effective, one would expect the Chicago basis to be relatively stable and predictable as contract maturity approaches. Chicago cash prices should differ from the price of the expiring futures contract for the same commodity by no more than the costs of delivery, except for brief periods. If no impediments to deliver exist, Chicago cash prices should range above and below expiring futures quotations with about equal frequency. One would also expect the variability of the Chicago basis against expiring futures contracts should gradually diminish during the final weeks of trading as the futures contract expiration date is reached.

If delivery problems occur, the Chicago basis could become wide and unpredictable causing the local basis in Iowa and other areas to become distorted and wider than normal. This unpredictability would make soybean hedging returns for producers more variable than corn and would likely be compensated for by widening merchandising margins in the grain trade.

In this analysis, no evidence of serious impediments to delivery on corn futures contracts was found. However, soybean basis behavior under expiring futures contracts has been much more erratic than on corn futures. In several instances, the soybean basis at contract expiration was wider than corresponding delivery costs. The soybean basis also tended to exhibit a downward bias rather than a distribution above and below futures prices with equal frequency. In each case where the Iowa soybean basis exceeded delivery costs, the Chicago basis also exceeded its corresponding delivery costs. These findings suggest impediments to delivery on futures contracts at times may have contributed to a wider than normal Iowa soybean basis.

Role of Storage Hedges

Hedging offered a potentially important role for Northwest and Southeast Iowa producers in marketing stored corn during the past six years. This marketing alternative would have generated increased returns and decreased variation in returns compared to unhedged storage for eight months beyond harvest. Hedging offered a less important potential role in marketing soybeans. In this case, returns in several instances were less than those from unhedged storage. However, the variation in hedging returns was substantially less than in unhedged storage and could be an important consideration for farm operators with limited financial risk-bearing ability. Hedging returns generally would not have covered the full off-farm costs of storing corn and soybeans for the time periods studied here. However, hedging more than covered variable costs of on-farm storage in most instances for corn and soybeans during the three month storage period.

New Crop Pricing Methods

Returns from forward contracting and preharvest hedging for harvest delivery during early June, mid-July, mid-August, and mid-September were compared to the average harvest prices received for the period 1976-79 for Northwest and Southeast Iowa. From this analysis, it was shown that new crop pricing offered a potentially important role for producers in marketing corn and soybeans during the study period. For corn, hedging or contracting in early June and mid-July for harvest delivery averaged about 25 cents above the returns received at harvest during all four years of the study period. As the growing season progressed beyond mid-summer, the results became more variable with hedging and contracting prices being either side of the corresponding average harvest prices, depending upon local and national market conditions. During the study period, average contracting prices were below hedging returns by 1 to 3 cents per bushel.

Variation in new crop prices in early June was lower then the corresponding range of harvest prices. However, from mid-July through the harvest period, new-crop prices became more variable. Increased variability might discourage some farm operators with limited financial risk-bearing ability from using these techniques routinely.

Routine new-crop pricing of soybeans in early June, mid-July, and mid-September would have provided average returns above those received from harvest sales. However, mid-August returns averaged slightly lower than harvest-time prices. The highest average returns occurred during early June and mid-July and averaged about 60 cents above the returns received at harvest. During the study period, average contracting prices were above hedging returns by 5 to 24 cents per bushel.

Year-to-year variation in soybean contracting returns increased moderately as the growing season progressed. Hedging returns decreased moderately from early-June to mid-August, then increased substantially in mid-September.

Concluding Remarks

Basis information is an important requirement for producers in choosing between hedging and contracting alternatives and in deciding when to place and lift storage hedges. Cash grain producers who are using these tools need to maintain and continuously update their records of local basis patterns for effective marketing. During the study period, the local basis for Northwest and Southeast Iowa has approximately doubled due to inflation in grain transportation and marketing costs. Cash grain producers also need to be aware of local supply, demand, and transportation conditions causing basis patterns to vary.

Hedging and contracting are important tools that can aid producers in risk management. However, for effective marketing these tools require continual analyses of market conditions and awareness of seasonal price tendencies.

The study also shows evidence of less than ideal basis behavior in the Chicago soybean market. Chicago basis behavior on soybeans is related partly to limit price moves that sometimes occur in futures markets and tendencies for traders to take "price protection" at such times. Erratic basis behavior also can be related partly to low soybean stocks available for delivery in Chicago. However, these conditions do not appear to be complete explanations of the tendency toward wide and erratic Chicago soybean basis as futures contracts approach maturity.

The effect upon the Chicago soybean basis from adding Toledo, Ohio as an additional delivery point in September 1979 is not yet known. More time is needed before this affect can be analyzed. This author suggests a need for regulatory agencies such as the CFTC to monitor Chicago soybean basis during contract expiration to determine whether the Toledo delivery point is leading to less variability in bean basis patterns.

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APPENDIX A

Appendix Table A-1. Estimated costs for delivery of corn and soybeans by rail from Northwest Iowa to approved futures delivery elevators in Chicago, mid-1974 through mid-1976 in cents per bushel

		Corn						Soybean					
Origin	Time interval	Single car[a]	Elevator charges[b]	Storage and insur.[b]	Interest on crop	Merchandising margin[c]	Total costs	Single car[a]	Elevator charges[b]	Storage and insur.[b]	Interest on crop	Merchandising margin[c]	Total costs
Denison	mid-1974	26.3	4.0	0.3	1.0	4.0	35.6	35.7	4.0	0.3	2.1	6.0	48.1
Sioux City		33.3	4.0	0.3	1.0	4.0	42.6	35.7	4.0	0.3	2.1	6.0	48.1
Spencer		25.8	4.0	0.3	1.0	4.0	35.1	35.7	4.0	0.3	2.1	6.0	48.1
Denison	mid-1975	29.7	4.0	0.4	0.9	5.0	40.0	39.9	4.0	0.4	1.7	7.0	53.0
Sioux City		37.2	4.0	0.4	0.9	5.0	47.5	39.9	4.0	0.4	1.7	7.0	53.0
Spencer		29.1	4.0	0.4	0.9	5.0	39.4	39.9	4.0	0.4	1.7	7.0	53.0
Denison	mid-1976	30.5	5.0	0.4	0.9	5.0	41.8	40.8	5.0	0.4	2.8	8.0	57.0
Sioux City		38.1	5.0	0.4	0.9	5.0	49.4	40.8	5.0	0.4	2.8	8.0	57.0
Spencer		29.7	5.0	0.4	0.9	5.0	41.0	40.8	5.0	0.4	2.8	8.0	57.0

[a]Obtained from Book of Grain Rates No. 16 West of the Mississippi (Chicago: Chicago Board of Trade Transportation Dept., January 2, 1976 and updated.)

[b]Obtained from personal communication with grain industry officials in Chicago.

[c]Assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and one area to another, depending on market conditions.

Appendix Table A-2. Estimated costs for delivery of corn and soybeans by rail from Southeast Iowa to approved futures delivery elevators in Chicago, mid-1974 through mid-1976 in cents per bushel

		Corn						Soybean					
Origin	Time interval	Single car[a]	Elevator charges[b]	Storage and insur.[b]	Interest on crop	Merchandising margin[c]	Total costs	Single car[a]	Elevator charges[b]	Storage and insur.[b]	Interest on crop	Merchandising margin[c]	Total costs
Burlington	mid-1974	21.6	4.0	0.3	1.0	4.0	30.9	25.8	4.0	0.3	2.1	6.0	38.2
Davenport		17.9	4.0	0.3	1.0	4.0	27.2	22.2	4.0	0.3	2.1	6.0	34.6
Washington		20.2	4.0	0.3	1.0	4.0	29.5	27.6	4.0	0.3	2.1	6.0	40.0
Burlington	mid-1975	24.1	4.0	0.4	0.9	5.0	34.4	29.1	4.0	0.4	1.7	7.0	42.2
Davenport		20.2	4.0	0.4	0.9	5.0	30.5	24.9	4.0	0.4	1.7	7.0	38.0
Washington		22.7	4.0	0.4	0.9	5.0	33.0	31.2	4.0	0.4	1.7	7.0	44.3
Burlington	mid-1976	24.7	5.0	0.4	0.9	5.0	36.0	29.7	5.0	0.4	2.8	8.0	45.9
Davenport		20.7	5.0	0.4	0.9	5.0	32.0	25.5	5.0	0.4	2.8	8.0	41.7
Washington		23.2	5.0	0.4	0.9	5.0	34.5	32.1	5.0	0.4	2.8	8.0	48.3

[a]Obtained from Book of Grain Rates No. 16 West of the Mississippi (Chicago: Chicago Board of Trade Transportation Dept., January 2, 1976 and updated.)

[b]Obtained from personal communication with grain industry officials in Chicago.

[c]Assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and one area to another, depending on market conditions.

Appendix Table A-3. Estimated costs for delivery of corn and soybeans by truck from Northwest Iowa to approved futures delivery elevators in Chicago, mid-1974 through mid-1976 in cents per bushel

	Corn							
Origin	Time interval	Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage and insur.[c]	Interest on crop	Merchandising margin[d]	Total costs
Denison Sioux City Spencer	mid-1974	27.0	11.0	4.0	0.3	1.0	4.0	47.3
Denison Sioux City Spencer	mid-1975	28.0	13.0	4.0	0.4	0.9	5.0	51.3
Denison Sioux City Spencer	mid-1976	29.0	14.0	5.0	0.4	0.9	5.0	54.3

[a]Obtained from personal communication with trucking officials in Iowa.

[b]Obtained from personal communication with Frank Polem, Chicago Board of Trade Transportation Specialist. Calculation is discussed in Chapter 3 of the text.

[c]Obtained from personal communication with grain industry officials in Chicago.

[d]Assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and one area to another, depending on market conditions.

Soybeans						
Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage & insur.[c]	Interest on crop	Merchandising margin[d]	Total costs
27.0	12.0	4.0	0.3	2.1	6.0	51.4
28.0	14.0	4.0	0.4	1.7	7.0	55.1
29.0	15.0	5.0	0.4	2.8	8.0	60.2

Appendix Table A-4. Estimated costs for delivery of corn and soybeans by truck from Northwest Iowa to approved futures delivery elevators in Chicago, mid-1974 through mid-1976 in cents per bushel

	Corn							
Origin	Time interval	Transportation[a]	Transit billing[b]	Elevator charges[b]	Storage and insur.[c]	Interest on crop	Merchandising margin[d]	Total costs
Burlington Davenport Washington	mid-1974	27.0	11.0	4.0	0.3	1.0	4.0	47.3
Burlington Davenport Washington	mid-1975	28.0	13.0	4.0	0.4	0.9	5.0	51.3
Burlington Davenport Washington	mid-1976	29.0	14.0	5.0	0.4	0.9	5.0	54.3

[a]Obtained from personal communication with trucking officials in Iowa.

[b]Obtained from personal communication with Frank Polem, Chicago Board of Trade Transportation Specialist. Calculation is discussed in Chapter 3 of the text.

[c]Obtained from personal communication with grain industry officials in Chicago.

[d]Assumed margin to cover operating costs at country elevators. Actual margins will vary from time to time and one area to another, depending on market conditions.

Soybeans						
Transportation[a]	Transit billing[b]	Elevator charges[c]	Storage & insurance[c]	Interest on crop	Merchandising margin[d]	Total costs
27.0	12.0	4.0	0.3	2.1	6.0	51.4
28.0	14.0	4.0	0.4	1.7	7.0	55.1
29.00	15.0	5.0	0.4	2.8	8.0	60.2

APPENDIX B

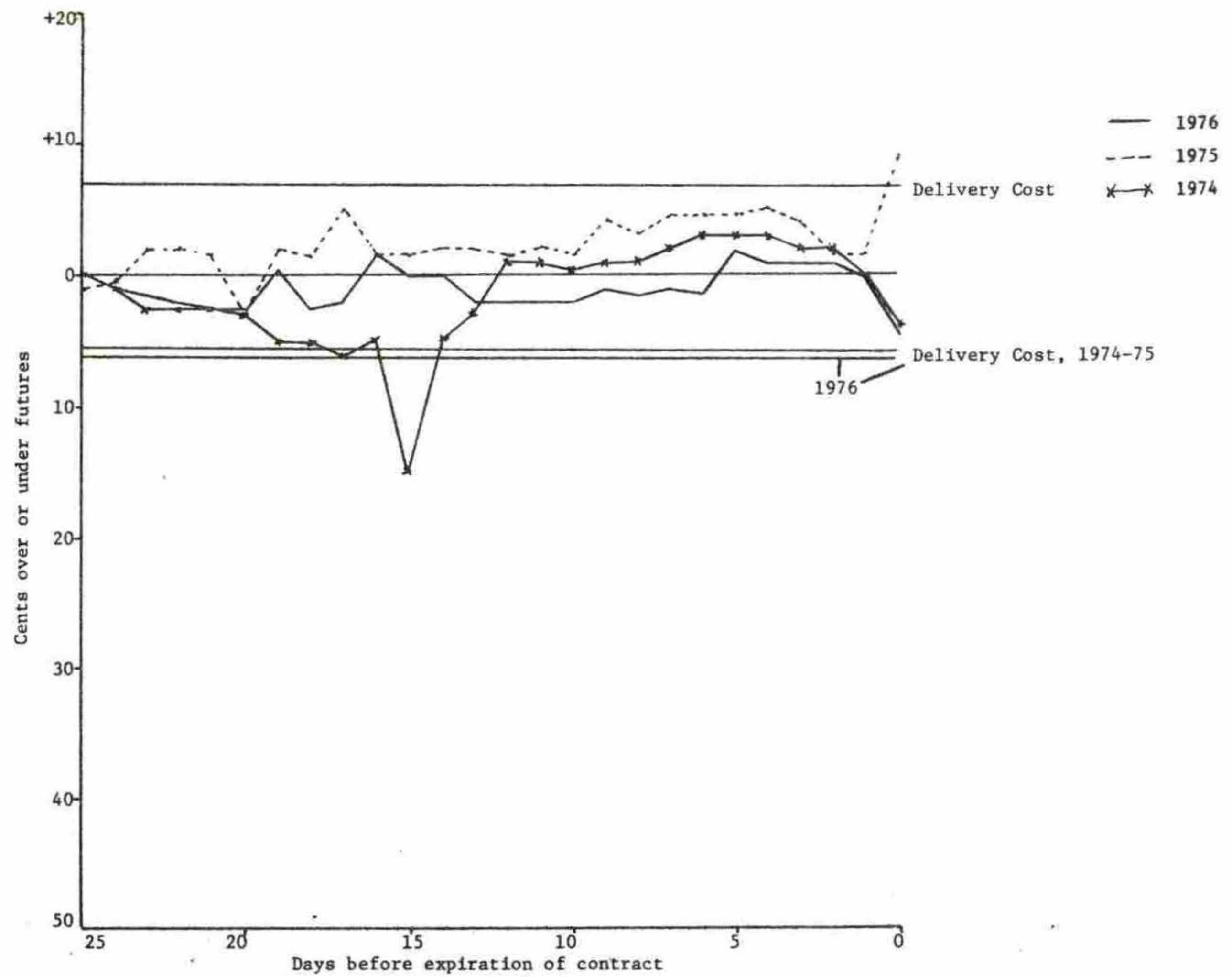

Figure B-1. Chicago box car corn basis for the March futures, 25 days prior to contract expiration, 1974-76

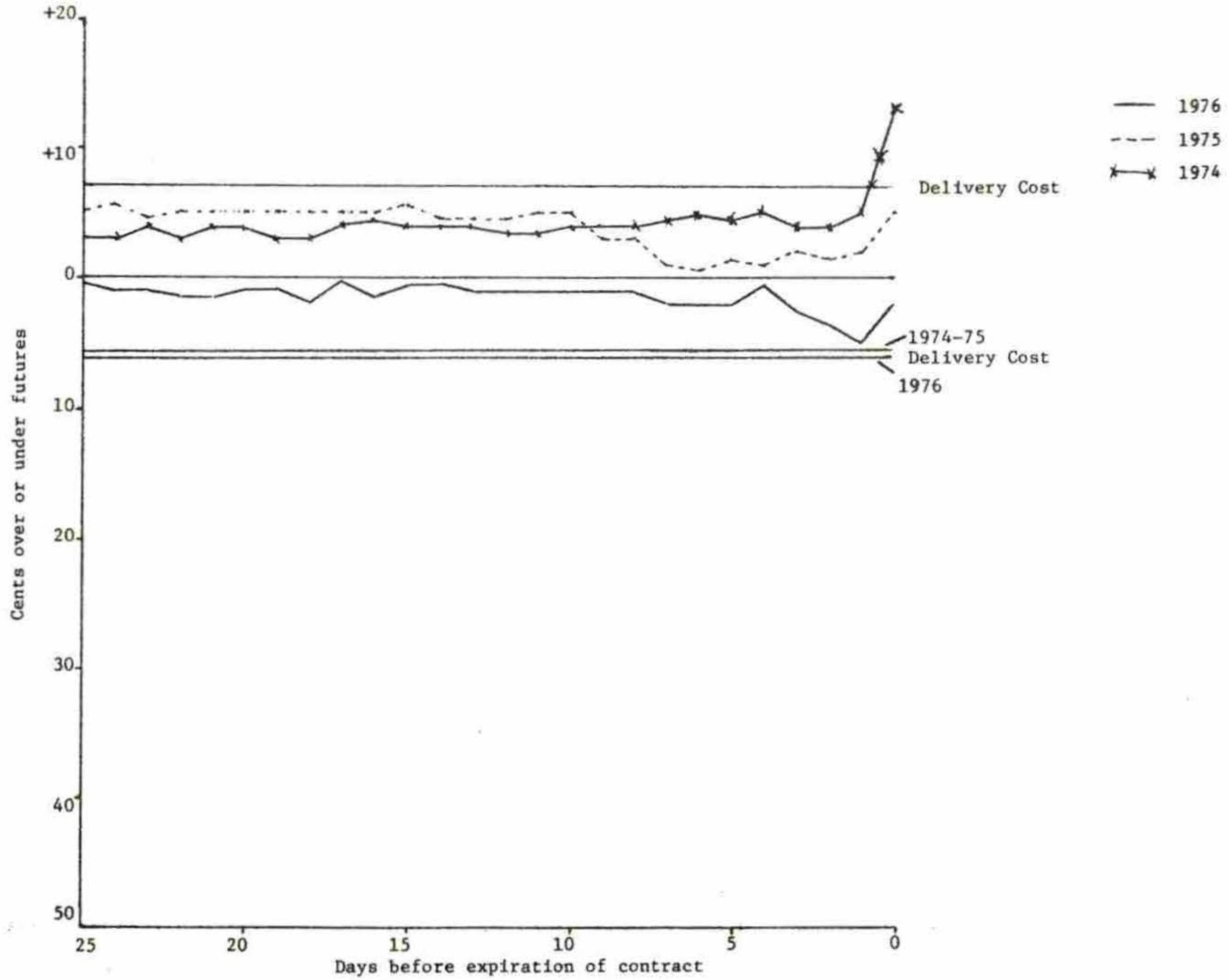

Figure B-2. Chicago box car corn basis for the May futures, 25 days prior to contract expiration, 1974-76

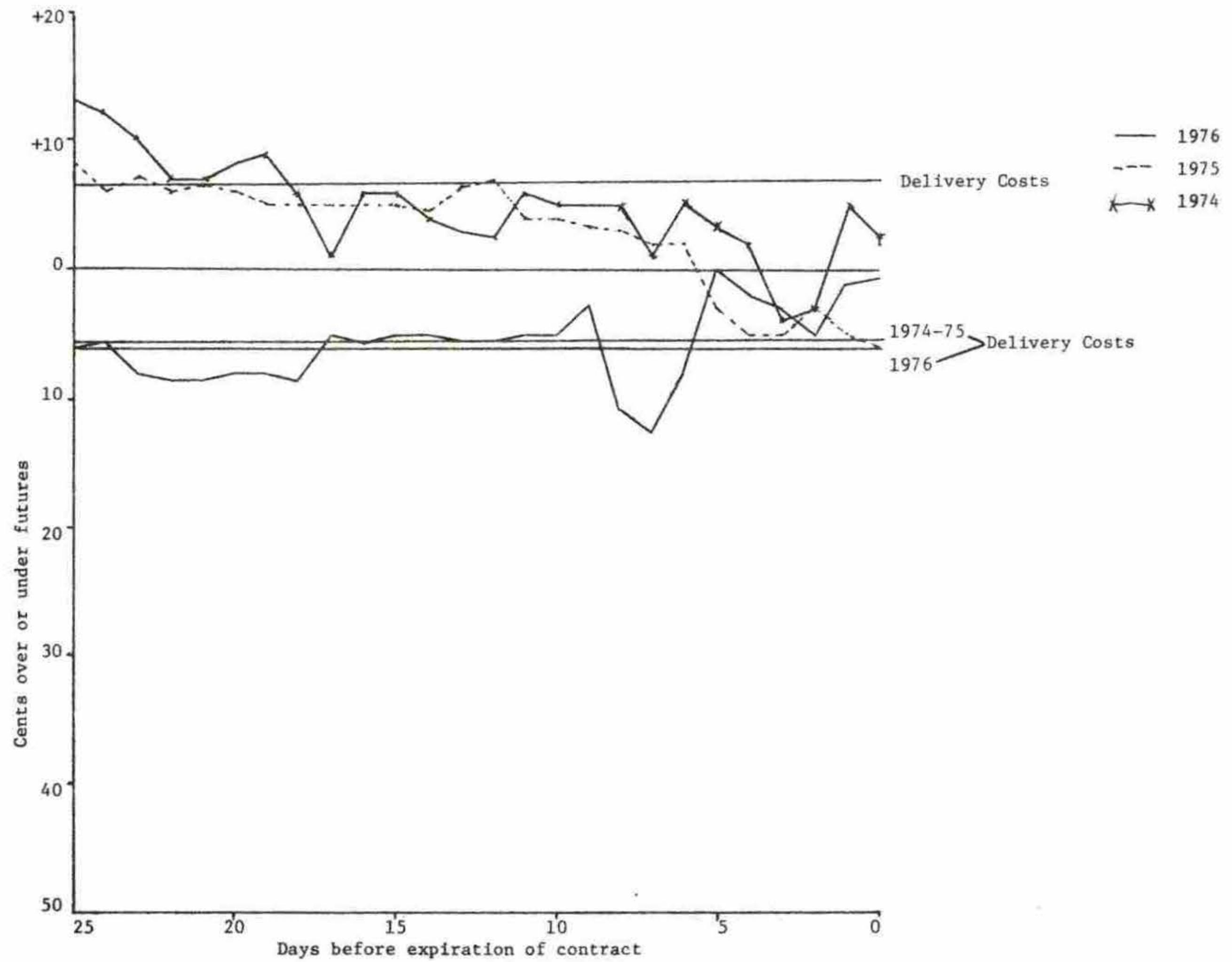

Figure B-3. Chicago box car corn basis for the July futures, 25 days prior to contract expiration, 1974-76

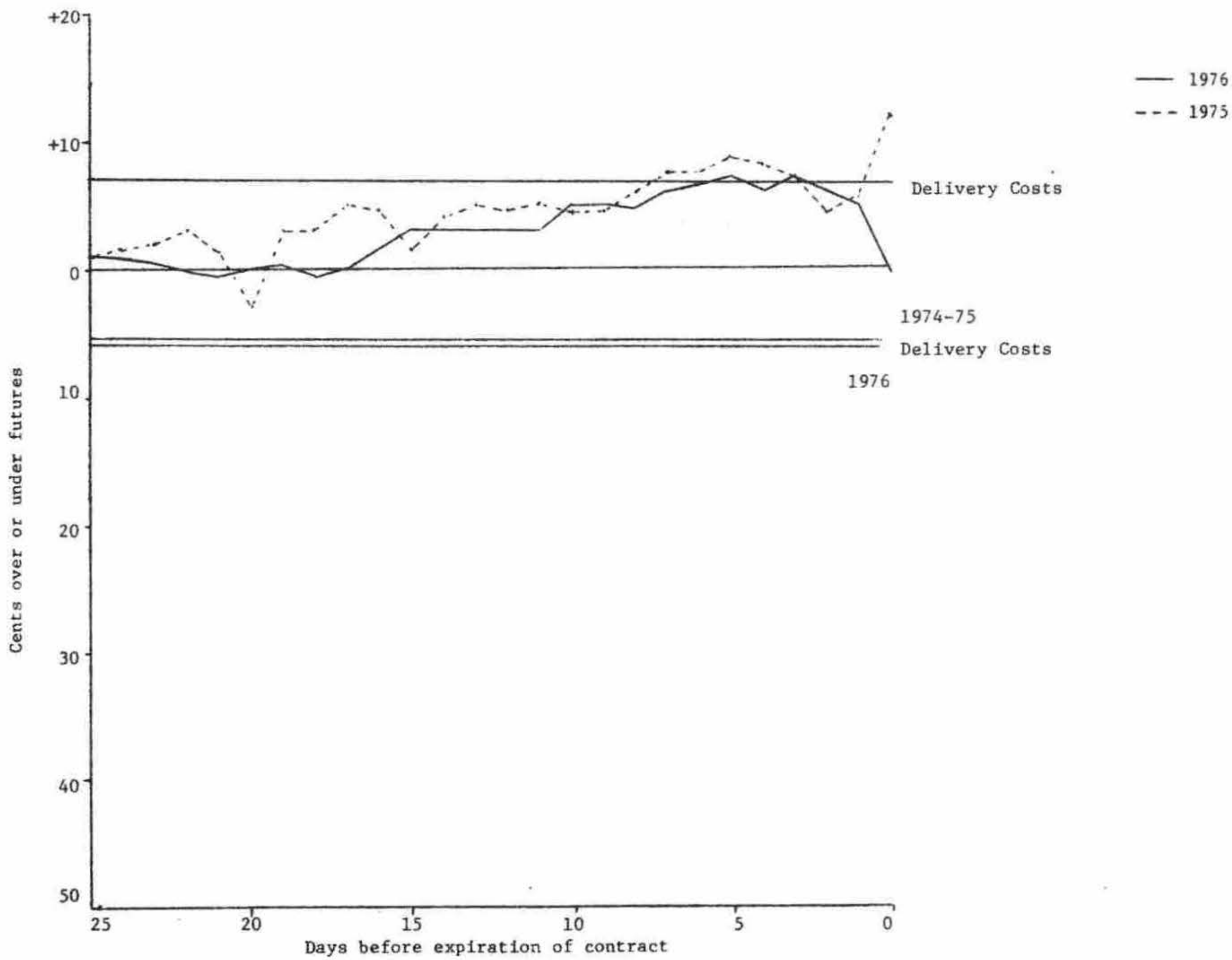

Figure B-4. Chicago hopper car corn basis for the March futures, 25 days before contract expiration, 1974-76

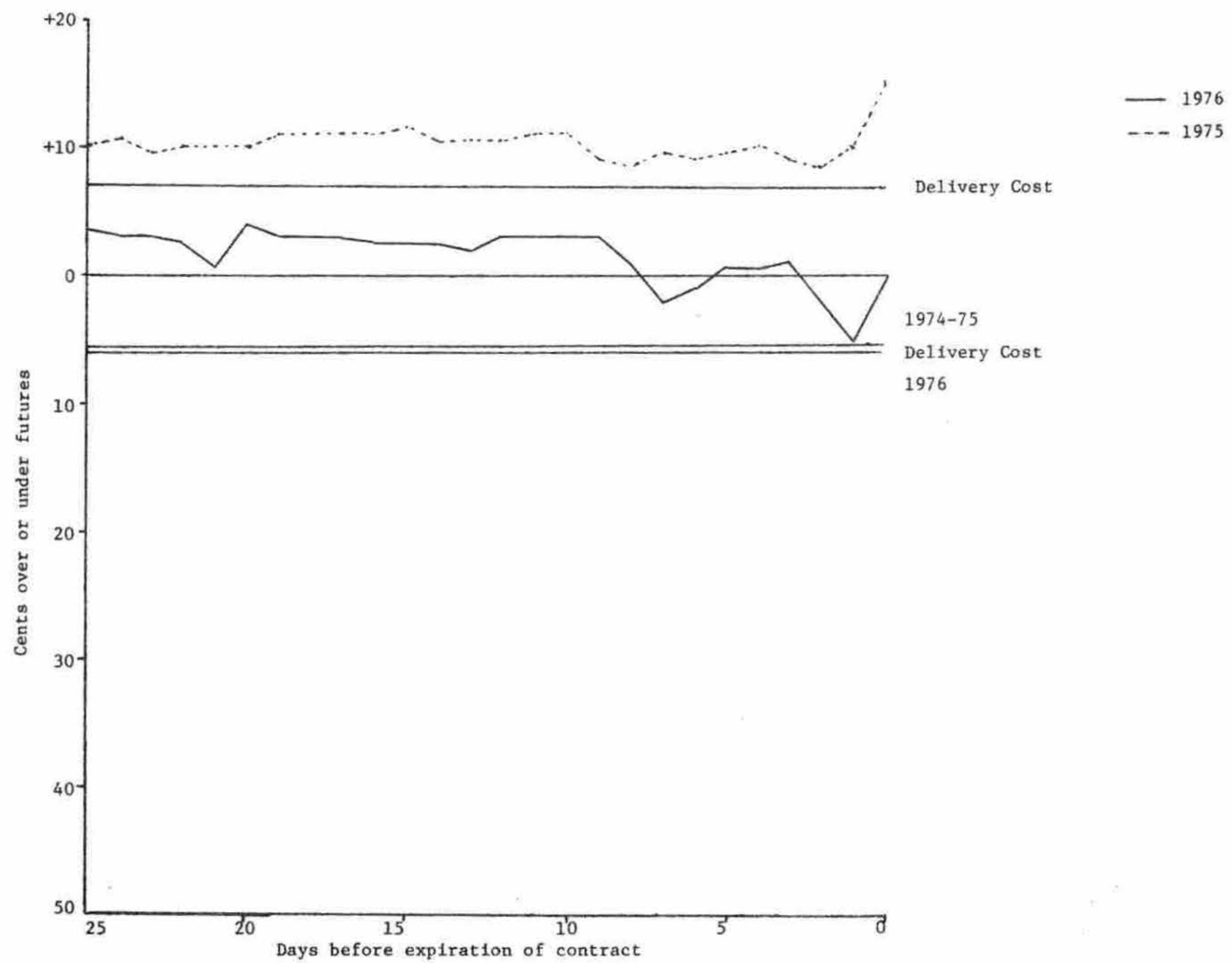

Figure B-5. Chicago hopper car corn basis for the May futures, 25 days before contract expiration, 1974-76

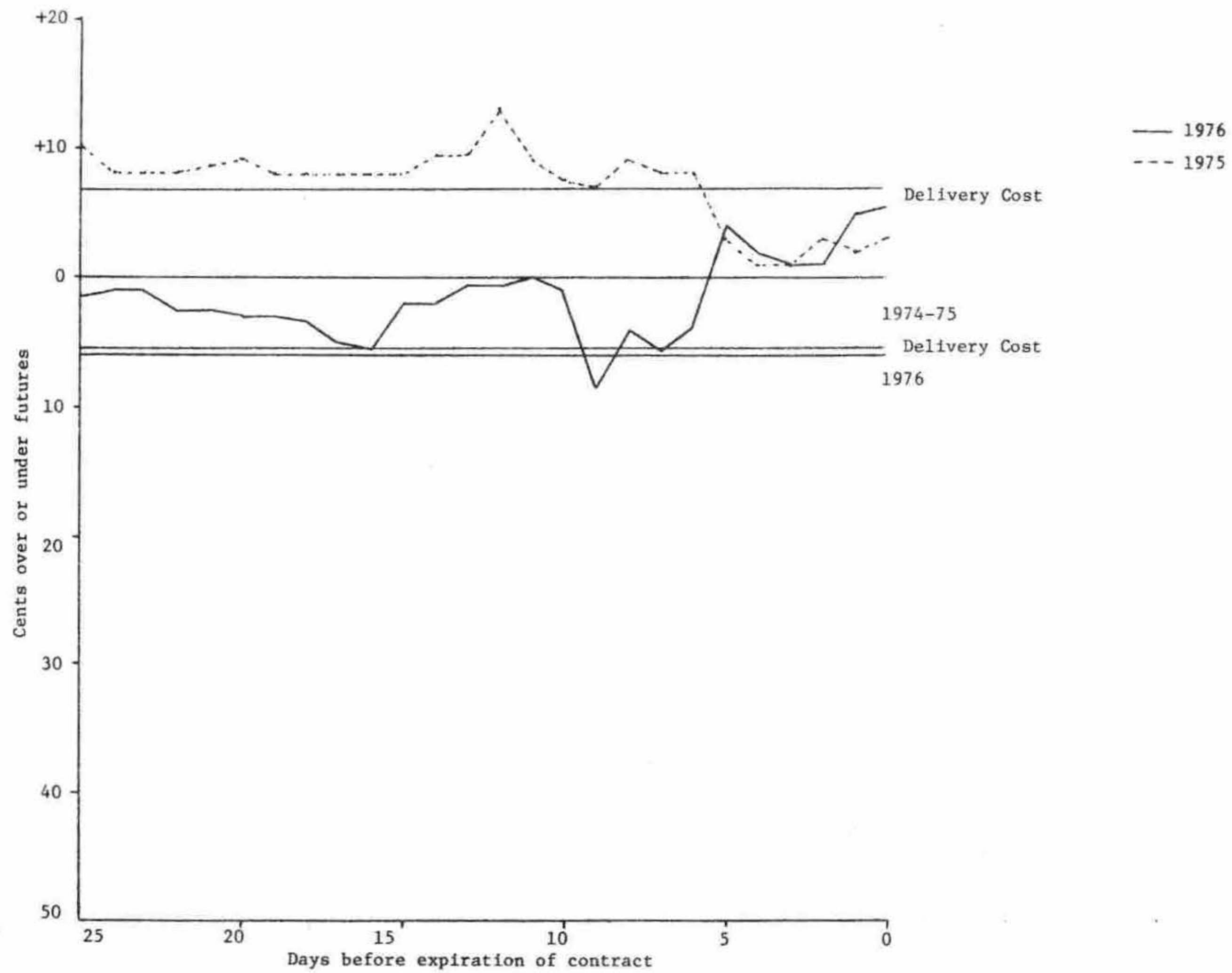

Figure B-6. Chicago hopper car corn basis for the July futures, 25 days before contract expiration, 1974-76

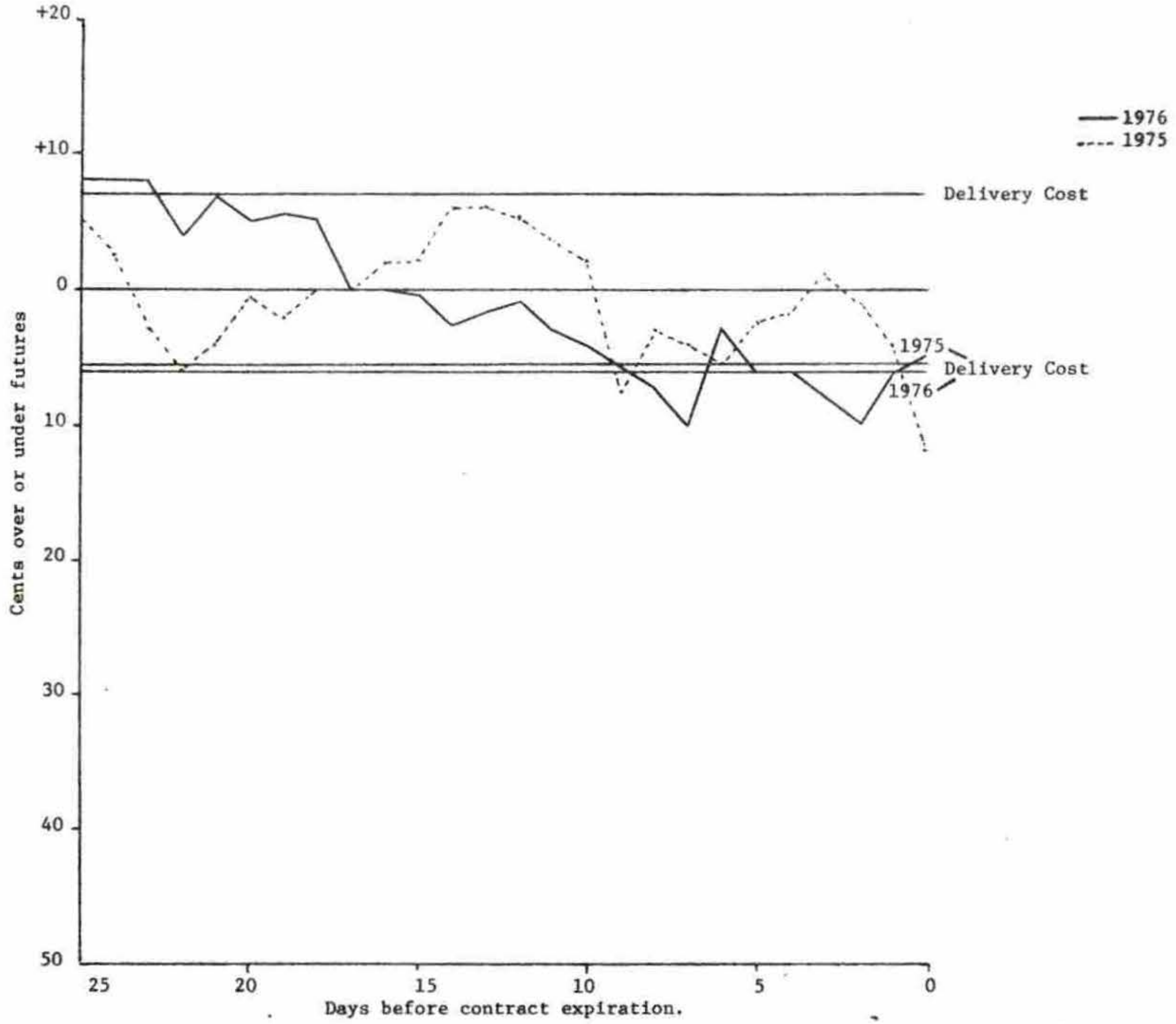

Figure B-7. Chicago hopper car corn basis for the September futures, 25 days before contract expiration, 1974-76

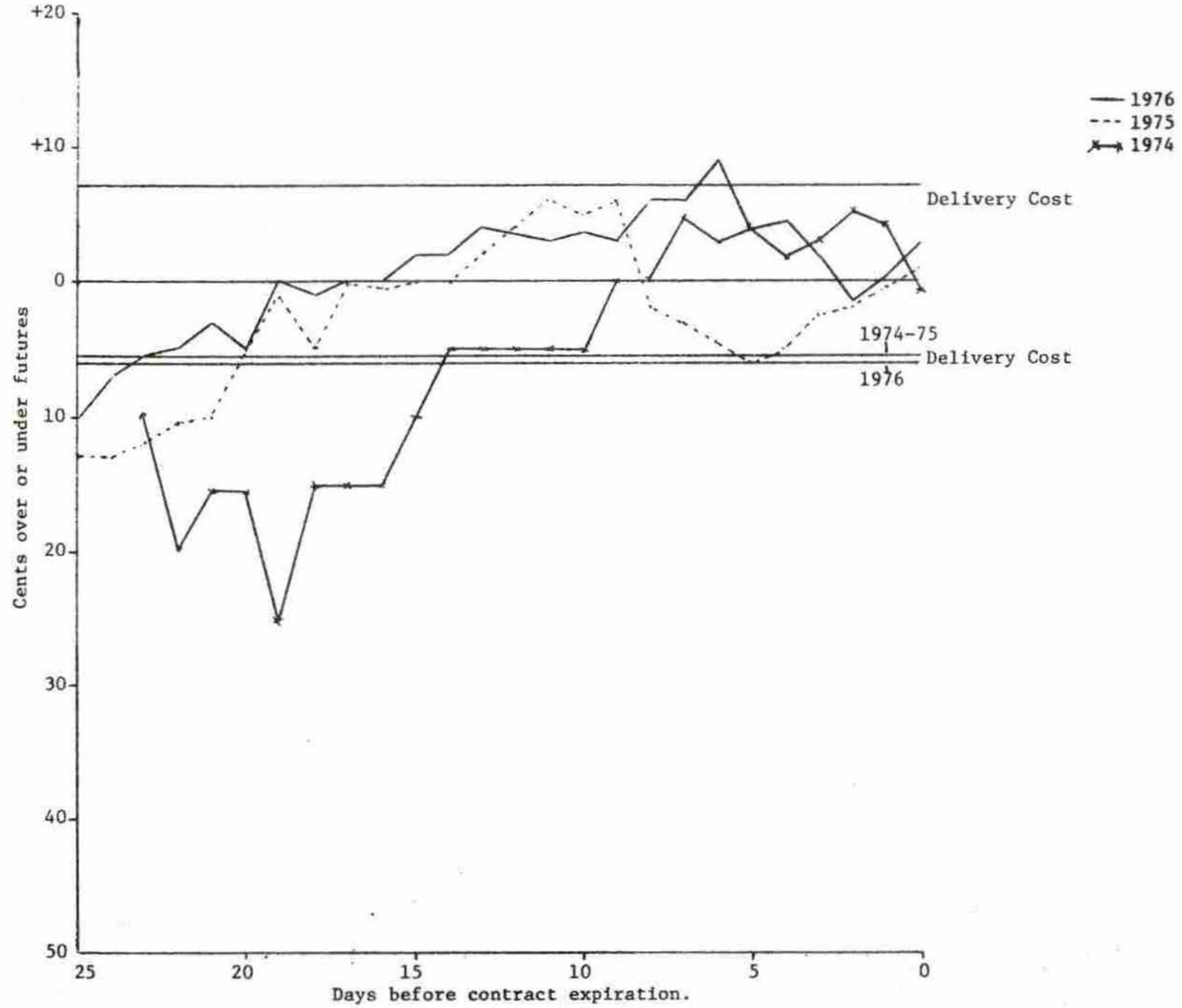

Figure B-8. Chicago hopper car corn basis for the December futures, 25 days before contract expiration, 1974-76

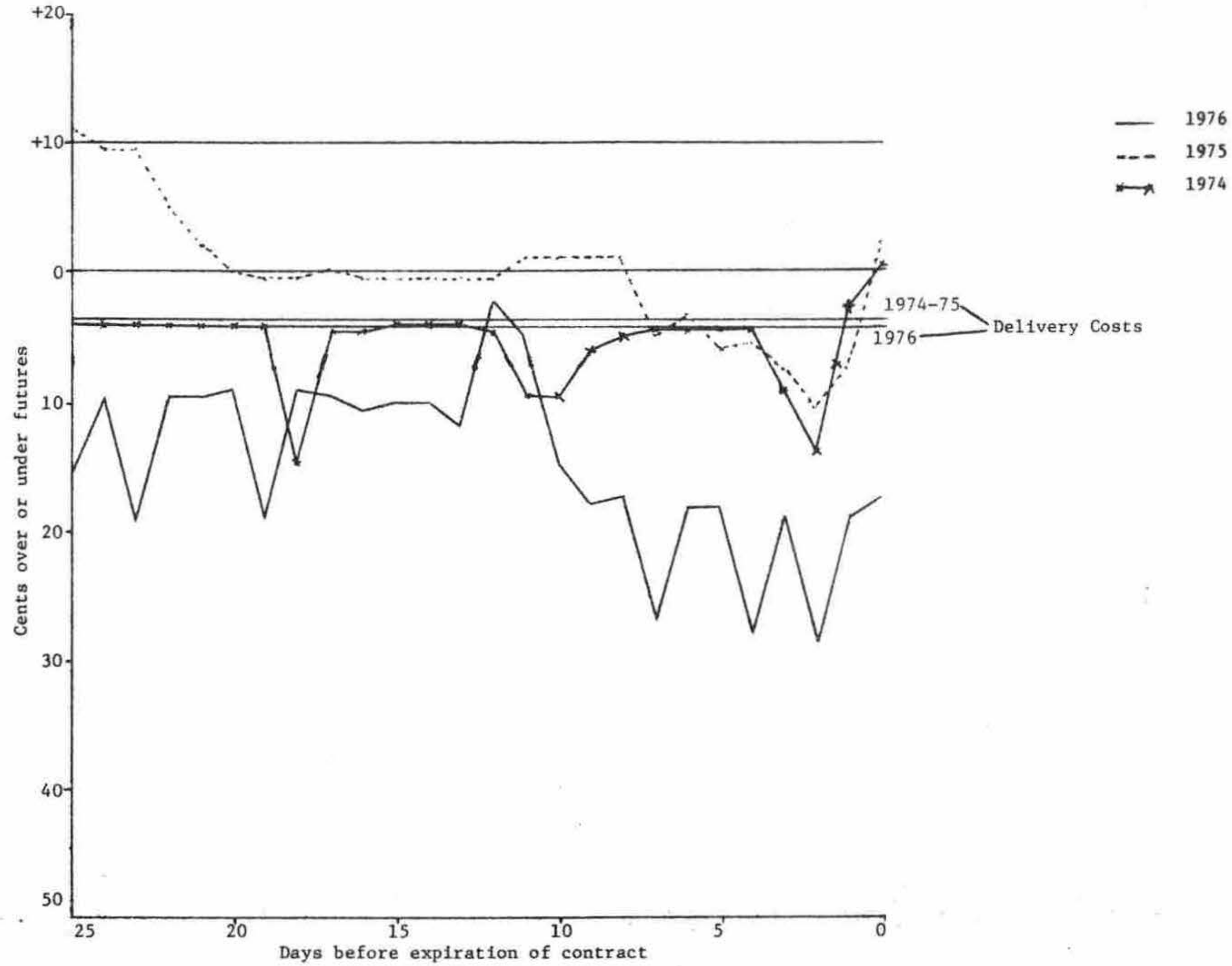

Figure B-9. Chicago soybean basis for the July futures, 25 days prior to expiration, 1974-76

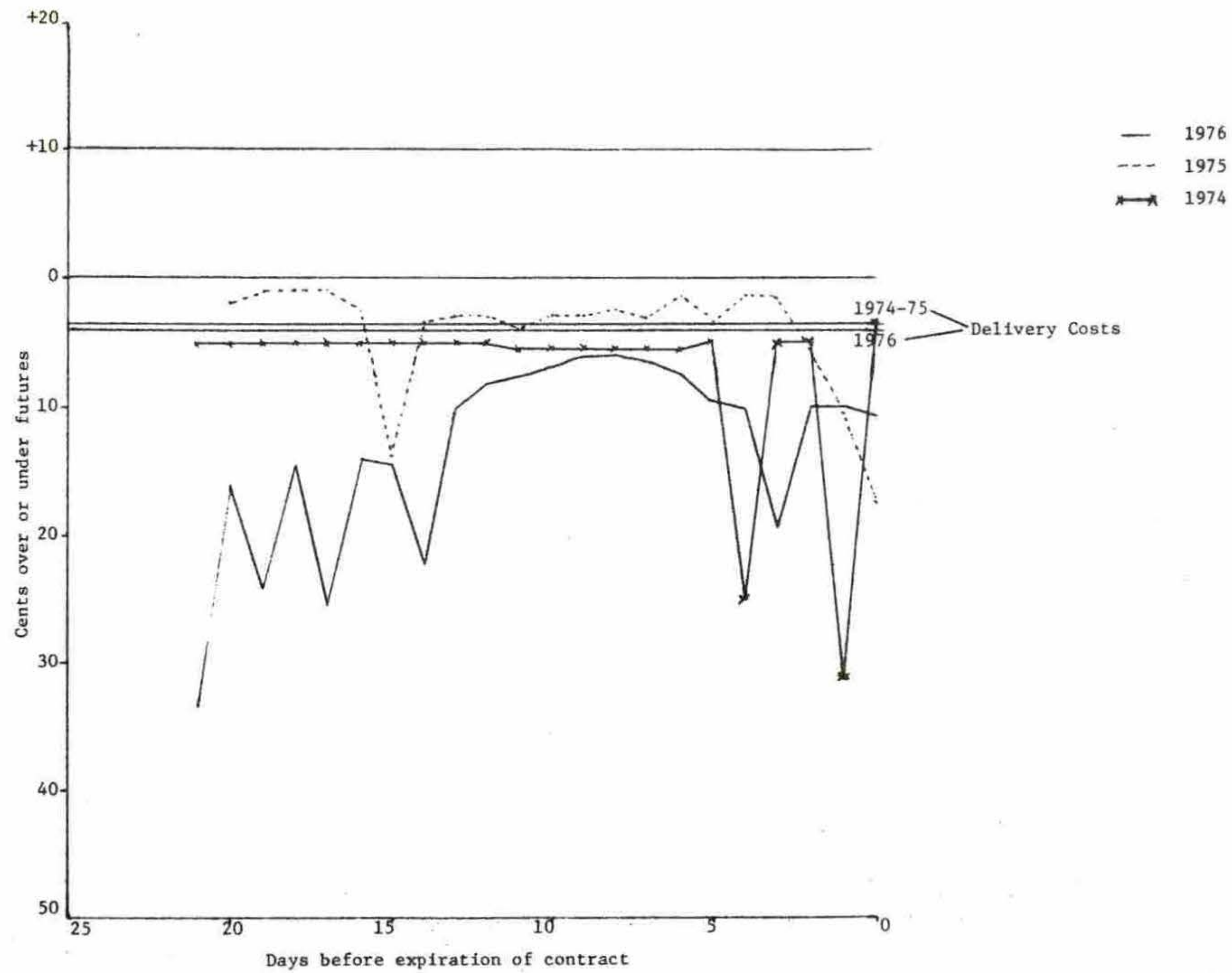

Figure B-10. Chicago soybean basis for the August futures, 25 days prior to expiration, 1974-76

APPENDIX C

Appendix Table C-1. Weekly corn and soybean storage hedge basis for Northwest Iowa, 1974-75 through 1978-79 marketing years, in cents under July futures[a]

		1974-75		1975-76		1976-77		1977-78		1978-79	
Month	Week	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans
Oct.	1	51	63	51	78	57	67	75	84	65	78
	2	57	100	47	82	53	65	74	79	70	74
	3	54	96	55	92	52	61	70	81	70	85
	4	53	106	57	85	52	56	65	76	71	87
	5	57	101	59	80						
Nov.	1	56	89	49	60	50	48	59	72	68	95
	2	53	93	41	65	50	39	57	69	67	89
	3	52	99	40	55	40	16	49	64	66	85
	4	50	74	40	53	38	20	47	62	65	78
	5										
Dec.	1	43	71	36	58	32	25	48	63	61	70
	2	41	73	33	59	31	26	45	59	56	71
	3	35	65	34	60	31	29	41	56	57	77
	4	30	74	34	59	33	34	41	54	58	79
	5			36	61	35	38	41	58		
Jan.	1	36	68	40	60	39	42	44	62	55	75
	2	34	63	39	62	38	50	43	57	53	67
	3	39	61	40	62	34	40	45	55	54	71
	4	40	65	39	62	31	45	46	53	52	76
	5	36	55								

Feb.	1	34	40	36	61	31	41	44	57	54	81
	2	28	37	39	61	34	48	45	58	56	88
	3	26	43	37	61	37	50	42	59	56	91
	4	30	54	40	60	37	51	42	57	58	91
Mar.	1	29	48	37	58	33	50	45	60	56	95
	2	21	35	34	55	34	48	50	67	56	88
	3	17	27	33	58	34	50	52	74	53	79
	4	17	27	33	57	35	54	53	69	57	77
	5					33	52	51	74	56	77
Apr.	1	18	22	30	52	35	51	47	52	59	75
	2	20	19	33	51	36	62	39	57	58	72
	3	12	11	32	51	33	41	42	60	57	71
	4	9	3	32	53	30	41	39	59	60	71
	5			31	48						
May	1	5	16	31	49	26	48	39	57	56	68
	2	5	19	31	42	27	35	40	53	54	62
	3	5	18	28	41	25	34	40	54	50	59
	4	7	19	29	44	27	33	41	54	51	55
	5	8	27							50	52
June	1	8	22	31	40	26	27	44	57	47	55
	2	13	20	32	45	24	22	42	55	53	64
	3	18	27	31	55	23	19	44	53	55	66
	4	19	34	30	44	26	30	44	43	52	67
	5					25	26	48	41		
July	1	20	37	25	44	27	35	45	45	56	61
	2	16	46	27	47	30	9	39	40	55	56
	3	32	52	23	50	--[b]	--[b]	36	34	61	53

[a]Basis figures were calculated by taking the difference between the Chicago Board of Trade futures closing price and the midpoint of the daily price range for Northwest Iowa. Sources for the calculations are presented in Chapter 1.

[b]The July futures contract expired before the third Thursday of July in 1977, thus no calculations could be made.

Appendix Table C-2. Weekly corn and soybean storage hedge basis for Southeast Iowa, 1974-75 through 1978-79 marketing years, in cents under July futures[a]

Month	Week	1974-75		1975-76		1976-77		1977-78		1978-79	
		Corn	Soybeans	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans
Oct.	1	34	46	47	70	52	57	62	76	53	58
	2	45	80	46	71	56	54	62	72	56	53
	3	40	78	53	84	57	57	58	75	58	62
	4	43	94	59	88	57	53	46	66	52	65
	5	49	93	53	80						
Nov.	1	45	75	50	65	54	37	38	60	53	71
	2	48	86	48	53	62	45	34	53	46	68
	3	55	95	43	49	44	15	34	51	45	65
	4	53	79	31	52	39	15	33	53	35	54
	5									41	56
Dec.	1	38	70	34	49	31	16	28	52	45	50
	2	33	65	38	50	32	20	29	45	43	53
	3	30	59	35	48	34	22	28	44	44	65
	4	28	80	40	63	37	23	28	44	42	61
	5			39	54	38	28	31	48		
Jan.	1	31	62	40	49	40	33	33	51	43	58
	2	28	54	37	48	40	44	34	50	40	54
	3	35	61	38	49	39	35	35	45	39	56
	4	35	50	32	46	37	43	34	47	40	37
	5	36	55								

Feb.	1	24	41	31	43	34	43	33	46	38	64
	2	19	29	32	43	38	45	32	52	40	77
	3	20	37	29	42	37	42	32	45	43	74
	4	22	39	28	39	39	43	31	49	45	75
Mar.	1	15	34	23	37	33	33	32	49	45	75
	2	9	18	20	37	32	27	34	49	42	68
	3	5	9	21	38	24	36	34	55	36	58
	4	11	13	19	36	30	37	37	47	33	52
	5					29	40	33	50	31	52
Apr.	1	9	11	18	33	27	34	25	27	32	51
	2	14	6	20	35	26	37	30	33	33	54
	3	12	4	21	36	22	14	31	33	32	53
	4	8	+5	22	39	20	21	28	33	31	52
	5			18	28						
May	1	7	2	17	27	18	34	26	35	32	47
	2	7	2	17	22	16	17	24	34	33	47
	3	5	2	17	23	19	16	29	33	31	41
	4	7	2	19	27	21	22	27	33	30	37
	5	4	6								
June	1	4	2	19	30	22	20	33	35	33	40
	2	3	3	21	31	23	24	27	27	37	48
	3	7	8	27	39	23	18	26	24	38	43
	4	10	13	22	29	23	26	32	28	44	53
	5					22	41	29	25		
July	1	13	18	23	41	21	26	29	31	38	35
	2	9	25	24	36	21	1	25	21	41	34
	3	29	23	19	36	--[b]	--[b]	24	14	40	28

[a]Basis figures were calculated by taking the difference between the Chicago Board of Trade futures closing price and the midpoint of the daily price range for Southeast Iowa. Sources for the calculations are presented in Chapter 1.

[b]The July futures contract expired before the third Thursday of July in 1977, thus no calculations could be made.