CHAPTER 12

Users of Raw Materials

We now move to the other side of the commodity market—that of buying for use. This is the province of the purchasing department. Commodities are raw materials used in the production of manufactured products destined for consumer markets. There are numerous commodities and comparably numerous kinds of industries that buy, convert and manufacture, and sell them. Some commodities are converted into finished consumer goods in one process while others are converted into products for further conversion and manufacture. Some processes are fairly simple and the end products of some raw materials closely resemble the original commodity while other processes are complex and the end products are only remotely related to the original material. Sirloin steak is identifiable with a live steer and the conversion processes are fairly simple but a bottle of soda pop does not resemble raw sugar nor is a cake mix closely related to the soybean that was the original source of one of the ingredients in the package.

There are futures markets for some commodities but not others. The use of futures markets is an integral and major part of the management of some conversion and manufacturing industries while it plays no part in others. Within industries, the different firms make different uses of futures markets, ranging from total involvement to none at all. Each industry and each firm has its own peculiar set of procurement and inventory problems. These relate to the nature of the raw materials, the end products, the price and pricing structure, and the firm structure within industries.

The great differences among materials, processes, products, industries, firms, and pricing arrangements and customs make generalizations about the use of commodity futures difficult. At the same time, the large numbers make even a cursory description of each impossible. Nor does any one person know a great
deal about the futures trading, inventory, and pricing activity of the gamut of processing and manufacturing firms. Very few systematic studies have been made in the area. Current positions and procurement and inventory policies are closely guarded company secrets.

Procurement and inventory management are areas of intense competition among firms and skill in these areas is of major importance in levels of company earnings. Company officials have been known to make such remarks as: "Anyone can operate a plant. We make it or lose it by buying, selling, and converting better than the competition" and "A plant is a thing we must put up with as an operating base for exercising our procurement, trading, and merchandising skills." These are overstatements but they do illustrate the importance attached to the area. It shows up in the company salary structure. The inventory management and price activity of one soybean processor is located in a small office deep in the bowels of a huge processing plant. It is under the control of one man who controls a few hundred square feet of office space and a handful of people. The plant is multi-storied, covers several acres, is loaded with intricate machinery, and has many employees scurrying about. It is controlled by a plant manager. The man who controls inventory and price usually has a higher salary than the plant manager.

Each raw material using industry has its own peculiar kinds of procurement and inventory management problems. Each firm within each of the industries is different from each other in such things as organization, size, financial strength, and marketing skills so that each has its own procurement or inventory management problems. Thus, market operations, futures market operations in particular, are highly individualized. Our objective here is to illustrate some of the kinds of problems encountered by operating firms and some of the procedures employed to cope with them. The literature in the area tends toward overgeneralization and stylized presentation. Most of it has been written by traders who were, in writing, trying to put the best possible face on futures trading for the benefit of legislators, educators, and the public. This is not to suggest that they are less than candid but rather the circumstances of presentation usually make candid exposition impossible. The observations here have been gleaned from a miscellanea of literature presented to legislative bodies, symposia, seminars, and forums and from conversations with operating people about specific, immediate problems.1

Flour Millers

One of the classic and most frequently used examples of a commodity buying hedge is the flour miller. A flour miller is a converter of wheat into flour and

1 It is worth noting that hospitality rooms at conventions are more conducive to candid comment than public forums, the proceedings of which are published.
feed by-products. The processes are fairly simple and flour is an undifferentiated product. There is one raw material and major product, the characteristics of which can be objectively measured. The process is a commodity to commodity conversion.

Wheat is not just wheat and flour is not just flour. There are several grades and classes of wheat and flour is made to the exacting specifications of individual buyers. The different flours require different classes of wheat and the principal flours are made from blends of several wheats. Soft wheat is required for the production of flour for cookie manufacturers and cake bakers. Low protein winter wheat is needed for production of family flour. High protein flour is made from northern spring wheat. Bakery flour is made from blends of ordinary protein winter wheat and high protein wheats. Clear flour for the export trade requires ordinary protein winter wheat. Semolina for the macaroni trade comes from durum wheat. There is a range of characteristics within these general classes of flour. The individual buyers have their own specific preferences for their own requirements. Advancing technology of milling has reduced the close identity of class of wheat to class of flour that once existed but has far from eliminated it.

Production of the different classes of wheat varies geographically. High protein spring wheats are produced in Minnesota and the Dakotas. The relatively high protein hard winter wheats are produced in the Great Plains states. Soft wheats and the not so hard winter wheats come from states east of the Mississippi River, particularly Illinois, Ohio and Indiana. Thus, Minneapolis is the market center for hard spring wheat and the delivery terms of Minneapolis futures contract require delivery of this high quality class of wheat. Kansas City is the market center for the high protein winter wheats and the delivery terms require moderately higher protein hard winter wheat. Chicago and St. Louis are market centers for soft wheat and the relatively low protein hard winter wheats. Chicago delivery terms permit delivery of nearly all classes of wheat. The geographic distribution, class considerations in flour production, and freight rate structure impose restrictions on the buying of cash wheat. The appropriate kinds of wheat for the specific kinds of flour to be made must be bought where and when they are available. Selection and purchase is a continuous process that cannot be coincident with the sale of flour.

Flour millers are price competitive. Flour users buy where they can buy at the lowest price and otherwise have little preference among millers. The per capita consumption of flour in the United States has declined, for many years, at almost exactly the same rate as population has increased, so that wheat used for human consumption has remained essentially constant. The lack of market growth, changing technology, and changing freight rate structure have resulted in more flour production capacity than there is demand for flour. There are numerous firms and plants. The industry is intensively competitive.
The price of wheat is independent of the price of flour. Wheat production in the U.S. has ranged from two to four times wheat use for flour for many years. Wheat is fed to livestock and exported. Prior to 1972, a high proportion of exports moved under government subsidy. Farmers were offered incentives to restrict wheat production and the government made nonrecourse loans to farmers. Large government inventories continually existed. This integrated, governmental wheat program dominated the price structure for wheat. Beginning with near failure of the Russian wheat crop in 1972 the control of wheat prices shifted from the U.S. government to world markets. World demand for wheat increased and there was another crop failure in Russia in 1975. Volatility of wheat prices was greatly increased. Flour milling is the highest value use of wheat but the price is established by forces outside of the U.S. flour-baking industry. Wheat is a small part of the cost—approximately 10 percent—of bread. Thus, price does not affect the quantity taken by the milling industry.

Flour is priced on the basis of the cost of wheat plus competitive milling margin minus the value of milling byproducts. The price of flour varies directly with and is closely related to the cost of wheat. The byproducts are millfeed—bran, shorts, and middlings—which are used in the manufacture of livestock feeds. The price of millfeeds is variable and must be taken into account in pricing flour.

The purchase of flour by bakers is seasonal and erratic. The buyers book substantial quantities at one time for deferred shipment. Some contracts extend as much as six months forward. The volume of forward booking varies greatly from year to year as well as within seasons. The period of heavy booking is in June and July. This forward booking is more typical of the bread bakery trade than it is of the specialty flour trade, but this is the bulk of the business. The bakers appear to base their purchases on three things: 1. Their price expectations about wheat. 2. A price of flour that will return baking profits at prices of bread that fit into merchandising programs, and 3. The price patterns and the proper timing of purchases the preceding season. They try to nail down their costs at levels that permit moderate and stable prices of bread. When flour prices permit the bakers preconceived bread prices they book heavily and vice versa.

Obviously, the bakery trade is highly speculative in its flour purchasing activity. This speculation is partly defensive and partly offensive. They book to defend a merchandisable price of bread on the one hand but book to fix a cost of flour lower than they judge their competitors can. In a sense, they are "damned if they do and damned if they don't." Note that this baker speculation in flour prices is not directly related to futures trading.

These several things make up the framework within which the flour miller must operate an inventory program. They can offset risks of price variations in the price of their wheat inventories by selling futures contracts. Their opera-
tions in this are the same as the merchant and warehouseman. Prior to harvest they tend to be long new crop cash and short futures. From the beginning of the flour booking period through most of the rest of the season, they are short cash flour and can offset risks by purchase of futures. The futures contract stands in the place of cash wheat until the appropriate class and quality can be accumulated.

Millers encounter problems in hedging flour sales in wheat futures. First, they must correctly anticipate the price of futures at which they can cover the flour sale. Sales that are made overnight must be anticipatorily hedged or the sale is vulnerable to the change in the wheat price from close to opening. The more serious price problem is the impact that millers' purchases may have on the price. The small, regular orders are not a problem but some of the bookings are large enough to require hundreds of thousands of bushels of wheat. Such amounts, purchased rapidly (within a session) may put the price up a cent, or two, or more. Bookings tend to come in epidemics. When one baker books, the rumors fly, and they all book. Such losses as may result from lack of perfect futures market liquidity must be correctly anticipated in pricing flour, for the milling margins are thin.

When wheat prices are active and speculators are trading in volume, liquidity is not a severe problem. Activity attracts the scalpers and pit traders who furnish short term liquidity. But when markets are quiet, the pit traders can't make any money and are elsewhere doing other things. Much of the time Chicago is the only wheat market that trades in sufficient volume to accommodate the large flour bookings that regularly occur. This attracts the booking hedges to Chicago. Without this hedging business the other markets tend to stagnate further so that the problem grows on what it feeds on. In thin markets, the premium that hedgers pay for prompt risk transfer can be substantial but to not hedge is also risky.

Second, millers must correctly anticipate the basis at which cash wheat will be purchased to replace the futures that serve as a hedge. The cash is accumulated over time and the basis changes. Flour millers must have and use skill in selecting the delivery month in which hedges are placed. Hedges must also be placed in the appropriate market. Ideally, the lower protein wheat hedges should go to Chicago, the ordinary protein wheat hedges to Kansas City, and the high protein spring wheat hedges to Minneapolis, but lack of liquidity may prevent this. The large hedges are placed in Chicago and sometimes gradually moved to the other markets as spreads can be executed at favorable differences. But "favorable" differences may never materialize; that is the hedger may have incorrectly anticipated the spreads that would prevail in the future. Hedgers must be competent intermarket spread speculators.

Third, there is no effective way to hedge requirements of high protein hard spring wheat. Delivery terms at Minneapolis require No. 2 Northern Spring
Wheat—13.50 protein or higher and No. 1 is deliverable at a 2 cent premium. But protein premiums are variable. They vary both within and between crop seasons. For example, during the first half of 1967 which related to the 1966 crop, 17 percent protein cash wheat at Minneapolis traded at the same price as 13 percent protein but during the second half of the year 17 percent sold at a premium of as much as 28 cents over 13 percent. A requirement hedge placed in Minneapolis March, 1967 wheat was quite effective but one placed in Minneapolis December, 1967 was not at all effective. Prior to 1972 the Minneapolis wheat price was tied closely to the government loan rate so there was limited variation in the base or deliverable price. Most of the variation was in the premiums and these were not hedgeable. Millers must speculate in protein premiums or forward contract cash wheat of specified protein content, letting someone else speculate in premiums.

Fourth, flour millers are subject to uncertainty because of variation in the price of millfeeds. About 28 percent of the weight of a wheat kernel is millfeed. Typically, this is 12 to 15 percent of the value. When millers cover flour bookings in wheat futures they are long millfeeds. In pricing flour, they must calculate a millfeed value that becomes a credit against the cost of wheat. To the extent that they overestimate the ultimate selling price of millfeed they suffer reduced milling margins and vice versa. Their preference is to contract millfeeds forward but this can be done only to a limited extent. Most of the millfeeds are consumed by cattlefeed manufacturers. Because these people book cattlefeeds forward in the fall of the year, they are interested in booking millfeeds. The feed manufacturers typically come in during September for millfeeds to be delivered from October through March. Their preference is October through January but the flour millers have a bigger problem and can put enough pressure on to get the longer period. This is at some price concession. Even so, 65 to 70 percent of wheat millfeeds are sold for spot shipment so that flour millers are chronically net long millfeeds to the extent of their flour bookings covered in both cash and futures wheat. If their forecasts are too high they lose part of their milling margins so they tend to be conservative, but if they are overly conservative they are not competitive in their flour price. Flour salesmen tend to be optimistic regarding millfeeds prices and in constant conflict with the analysis and conversion people within the company.

There is a way out; they can sell corn or oats futures. Millfeeds, corn, and oats prices tend to vary generally together, but the relationship is not close. Millers may hedge millfeeds in corn or oats futures when they judge the risks of variations in price relationships are less than those of a decline in millfeeds prices. They tend to do this only when they judge millfeed prices are inordinately high, and corn or oats prices are high relative to millfeeds prices.

The preceding discussion assumes risk minimization activities by millers. The open interest of long hedgers in wheat futures contracts appear to be substantially less than the forward bookings of flour. Part is offset by cash wheat but an
apparent discrepancy remains, suggesting that not all millers are fully hedged. Because of the size of their positions and because they borrow large amounts of operating money, the large millers maintain a fairly close balance between wheat inventories, cash, and futures, and flour sales. They tend to accumulate net long futures positions in wheat ahead of the flour buying season. They judge the moods and expectations of their buyers and anticipate sales with wheat purchases. They do not always cover bookings promptly but may string the process out over several weeks when bookings of the industry as a whole are large and the millers judge that the coverage of bookings is the major price supporting factor.

Smaller companies appear to hedge a smaller proportion of their wheat requirements than do the large companies. Part of this difference stems from less exacting requirements on the part of their bankers, part from ignorance of the use of futures, and part from being out of position—out of the mainstream of the flow of wheat and flour. They can often buy wheat near their plants at prices that are dependent on flour prices; that is, their acquisitions are less competitive.

The integrated companies that mill wheat and manufacture branded products such as cake mixes, cookies, crackers, party snacks, etc. are less regular hedgers than the specialized millers. They can set prices on the basis of wheat costs more effectively than can millers of bakery flour. Their hedging activities are influenced more by their price expectations than are those of the straight millers.

**Soybean Processors**

The soybean processing industry is unique among the agricultural industries in that there are active futures markets on both the raw material and product sides. The industry is confronted by organized speculation in buying raw materials and in selling products. This participation in pricing of both sides of the process results in broad participation in the pricing of the process. In other industries, as flour milling, the competition in the processing margin is with other converters so that margins are set by the industry, but the whole speculative fraternity gets involved in soybean processing margins. In the final analysis, processing margins are determined by interprocessor competition but, in the meantime, speculative markets result in great latitude of opportunities for processor pricing of the conversion process. Their operations are sometimes quite intricate and much of the difference among earnings of processors is determined by differences in skill in maneuvering within the pricing complex. The games they play is a subject worthy of a book and can be only hinted at here.

The soybean has only one significant use—processing into two very different products, crude soybean oil which is used for further refining and manufactured into food ingredients, and soybean meal which is nearly all used for livestock
feed. The soybeans that are exported from the United States are processed abroad so that processor competition is international. Soybeans are nearly homogeneous, having only minor differences in oil content. Both oil and meal are produced to standard grades so that they are fungible raw materials. There are two kinds of meal, one 44 percent protein and the other 49 percent. In making 49 percent meal the fibrous hulls are removed from the soybeans before processing. Soybean meal is valuable for its protein content so that 49 percent meal sells proportionately higher than 44 percent. Many plants are equipped to make both kinds of meal. The bulk of the meal produced (approximately 60%) is 44 percent, although most of the meal produced in eastern trunk line territory is 49 percent.

Most soybean processing plants are located in the soybean production areas. Soybeans move from farm to country elevator to processor. Some are stored on farms, some at country elevators and most processors have extensive storage facilities. Stocks at plants typically reach a peak in November and are usually reduced to negligible levels in mid September. For the industry as a whole, peak stocks are sometimes as high as 30 percent of a year's use. The firms located in the interior sometimes own as much as 50 percent of a year's requirement immediately following the harvest. Relatively few country elevators own soybean inventories, limiting storage to farmer owned beans. Thus, processors must buy soybeans as farmers wish to sell. Soybean prices are volatile; processors have major inventory and risk management problems.

Soybean products are shipped as they are produced. Processors provide facilities for the storage of some oil but their stocks never amount to a significant percentage of a year's production. Meal stocks at processing plants rarely exceed 2.5 percent of a year's production. Oil is sold to refiners and meal to feed manufacturers and feed ingredient merchants. Some sales of oil and meal are made for quick shipment but most are sold for deferred delivery. Most of the forward contracts are made for shipment in less than 90 days. Users also maintain limited storage facilities and the forward contracting is mainly a scheduling convenience for both processors and users. In addition to plant scheduling convenience, freight billing for meal plays an important part in processing operations. Outbound shipments of meal must be matched to inbound shipments of soybeans.

As noted in an earlier chapter, there was, in former times, very extensive and extended forward contracting of both oil and meal. Some of this remains, particularly for meal. Some meal for October-March shipment is contracted during the summer and the fall harvest period. The essential point is that the forward contracting option is open to soybean processors.

The soybean processing industry has grown rapidly as the market for soybean products has expanded: from a crush of 251 million bushels in 1950-51 to 402 million in 1960-61 and 738 million in 1969-70. In spite of this rapid growth, it has always been an industry of over-capacity. In only one year, 1969-70, was the
supply of soybeans and the demand for products larger than the crush capacity. Prior to 1950 the main method of oil extraction was by machines called expellers. From the latter 1940's to the early 1950's the industry changed to chemical solvent extraction which essentially doubled the capacity for the time that the expellers remained in use. In the early days there were numerous small mills and a few large ones. There are economies of scale so that the industry gradually shifted to large mills with an accompanying overcapacity. In the early days soybean production was concentrated in four cornbelt states, Ohio, Indiana, Illinois, and Iowa. The rapid expansion of the industry was in the mid-south and southeast and plants were built in those areas. There are freight and tariff advantages to shipping soybeans rather than products, contributing to plant building in Europe and Japan.

Many soybean processing plants were built as vertical extensions of firms using soybean oil and meal. Starting in the 1950's, the oil users sold most of their facilities (or let them go out of use) so that little soybean oil to shortening, salad oil, etc. remains although some soybean processors have added oil refineries. Most soybean processors are part of companies that use soybean meal in feed manufacture. But meal is sold to feed manufacturers other than the parent companies and meal is bought from plants other than those owned by parent companies. Ownership is integrated but operations are not.

A few large firms have a large share of the soybean processing business but there are numerous firms. There is no price and margin domination or leadership in the industry. The market operations of some firms are watched closely by other firms and by speculators but market positions are carefully masked.

Market prices of soybeans, oil, and meal are fully competitive and reported. Thus, it is possible to compute existing processing margins. Processors operate in a fishbowl; all of their buying and selling prices are known and only the amounts traded at the various prices are private information. A bushel of soybeans produces about 47.5 pounds of 44 percent soybean meal and 10.6 pounds of crude soybean oil. The reference price of soybeans is track, Illinois points, that of meal is bulk, Decatur, Illinois, fully unrestricted rail billing, and that of oil is crude, Decatur, in tank cars. Thus, if the price of oil is 18.5 cents per pound its value is $1.961, if the price of meal is $160.00 per ton its value is $3.80 and the combined value is $5.761. If the price of soybeans is $5.53, the processing margin is 23.1 cents. Soybean and soybean product prices vary geographically and are different for different times of delivery so that this stylized margin does not measure actual returns to processors. But the price structure is interrelated over time and space so that the stylized margin is indicative of the general level and changes in actual margins.

Prior to 1972 operating costs, including overhead, depreciation, and nominal return on capital appeared to be on the general order of 18 cents per bushel. However, it also appeared that a stylized margin of 12 cents kept the vigor of processor complaints at moderate levels. A 12 cent margin tended to generate a
maximum crush but at lower margins they cut back. Processing margins are highly variable between years and within years. Average crush margin for six years was:

<table>
<thead>
<tr>
<th>Year</th>
<th>Crush Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-63</td>
<td>9.36</td>
</tr>
<tr>
<td>1963-64</td>
<td>-1.07</td>
</tr>
<tr>
<td>1964-65</td>
<td>6.12</td>
</tr>
<tr>
<td>1965-66</td>
<td>22.65</td>
</tr>
<tr>
<td>1966-67</td>
<td>12.85</td>
</tr>
<tr>
<td>1967-68</td>
<td>10.90</td>
</tr>
</tbody>
</table>

In 1963–64 there was a shortage of soybeans that resulted in a reduction in crush from 475 million bushels to 440 million. In 1965–66 soybean supplies were large so that farmers did not hold strongly. Product demand was excellent and prices rose substantially. Soybean prices also increased, but processors were able to get the best margins in many years. By months, the average processing margin for the six years was:

<table>
<thead>
<tr>
<th>Month</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct.</td>
<td>19.8</td>
</tr>
<tr>
<td>Nov.</td>
<td>15.7</td>
</tr>
<tr>
<td>Dec.</td>
<td>9.7</td>
</tr>
<tr>
<td>Jan.</td>
<td>10.6</td>
</tr>
<tr>
<td>Feb.</td>
<td>8.0</td>
</tr>
<tr>
<td>Mar.</td>
<td>4.7</td>
</tr>
<tr>
<td>Apr.</td>
<td>3.6</td>
</tr>
<tr>
<td>May</td>
<td>1.9</td>
</tr>
<tr>
<td>June</td>
<td>5.6</td>
</tr>
<tr>
<td>July</td>
<td>7.0</td>
</tr>
<tr>
<td>Aug.</td>
<td>12.7</td>
</tr>
<tr>
<td>Sept.</td>
<td>23.6</td>
</tr>
</tbody>
</table>

The moral of this story would seem to be: Operate the plant August through January and quit. But closing down does not stop the overhead nor can a labor force be dismissed and reassembled so readily. A better solution would seem to be to buy soybeans at harvest and contract products forward, extending the favorable processing margins forward through the February-July poverty period. But it is not that simple.

There is one more parameter of the processing margin. There is a stock of soybeans that is carried hedged in soybean futures. This stock, with its accompanying cost of storage, forces a carrying charge structure in the futures market. Typically, there are only small inventories of oil and meal. Accordingly, there is no way to force a carrying charge structure. Cash soybean prices gain relative to the futures but cash product prices do not. The result of this is that spot margins may be profitable in the fall of the year while the margins shown by the forward futures—say May soybeans compared to May oil and May meal—may reflect a negative processing margin. For example, on May 25, 1970 processing margins as shown by various futures prices were:

<table>
<thead>
<tr>
<th>Cash</th>
<th>Soybeans versus Cash products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 1971</td>
<td>soybeans versus Jan. 1971 products 7.68¢</td>
</tr>
<tr>
<td>Mar. 1971</td>
<td>soybeans versus Mar. 1971 products 1.40¢</td>
</tr>
<tr>
<td>May 1971</td>
<td>soybeans versus May 1971 products -1.50¢</td>
</tr>
</tbody>
</table>
Processing margins for immediate shipment were unusually favorable. The farther they were extended into the future the less favorable they became.\(^2\)

Such is the world in which processors must operate. They attempt to buy soybeans and sell products at differences that result in profitable processing margins. While processing margins are unprofitable a high proportion of the time, in every season there is a time when they are profitable and there is a combination of positions and trades that permits a profit for the year. The options are numerous and complex.

An option that is always open to processors is to speculate in price levels of soybeans and products. They do this to varying extents; some not at all and some substantially. In the main, they must maintain fairly evenly balanced positions to avoid the ruinous losses that would inevitably occur and put them out of the game, and to obtain operating capital. As a general rule, the larger the firm the more closely balanced are the market positions. Price level speculation is regarded as a subtle form of cheating. It is outside of the game of trying to carve a margin out of price relationships. It may work but it doesn't require a processing plant and thus is not within the processing game. Some of the "legitimate" options are:

1. Buy cash soybeans as they are available, hedge them in soybean futures. Sell cash products as they are produced and remove the soybean hedges as products are sold. The result of this is to accept spot margins as they exist.

2. Buy cash soybeans and sell product futures, placing the product hedges in the months in which the soybeans will be crushed. Product hedges are removed as cash products are sold. By selling product futures rather than soybean futures, the processor is accepting the margins offered in futures.

3. Buy cash soybeans and sell products forward in cash markets. This can be varied by selling futures for one product and making cash forward contracts for the other.

4. Buy cash soybeans and sell product futures, placing product hedges in months other than those in which the beans will be crushed. For example, for soybeans bought in November the oil fraction might be sold in January futures and the meal in May futures if the oil market is inverted and the meal market has a carrying charge. This may result in capacity being oversold for oil and undersold for meal and so requires further action at a later time, moving some of the oil hedges forward and some of the meal hedges back to closer deliveries.

5. Buy cash soybeans and hedge in soybean futures while at the same time selling oil or meal or both cash forward and hedging these positions in oil and meal futures. This, in effect, postpones the acceptance of processing margins.

\(^2\) In earlier times—about 1950 to 1960—this normal inversion of processing margins shown in futures was a source of profit to informed speculators. The negative margins usually turned positive as the delivery month approached, as they had to, to get soybeans processed. Early in the season speculators sold distant soybean futures and bought product futures. The game was called "reverse crush." Processors played it too. In time it became so widely practiced that its reliability and predictability was lost.
6. Buy soybean futures before cash soybeans are available and sell products either in cash forward or futures markets. This process is called putting on "board"\(^3\) crush. The effect of this is to accept the current crush margins rather than waiting until cash soybeans are available. In the simplest form, soybean and product futures are matched, January soybeans to January products, etc. and the volume in each of the delivery months matched to the expected crush rate. However, positions need not always be matched by delivery month and capacity can be oversold.

7. Processors can and do reverse crush, selling soybean futures and buying product futures. It may be that they have put on board crush at profitable levels and reverse the position when margins turn unprofitable, taking profits. Or they may start with a reverse crush, particularly in forward positions, thinking that margins can only improve. There is no theoretical limit to the number of times that crush can be put on and removed within a season but there are practical limits. Processors do not like to reverse crush because they find that they are their own worst enemies when they merchandise cash products. They are selling cash at the same time they are liquidating futures positions.

The core of the processing activity is purchase of soybean futures and the sale of products futures, matched by delivery month and related to plant capacity. The relationship of futures to futures is the basic crushing margin. All of the other trading activities are basis and spread trades in relation to it. The combination of soybean and product futures gives processors very wide latitude in the selection of the time that they accept existing crushing margins. They can put on a year's crush months before the crop is raised or they can, by buying soybean futures and selling product futures after the cash soybeans are crushed and the products sold, delay the acceptance of crush margins until the end of the year. The key decisions that crushers make relate to the timing of putting on crush.

The intricacies of processor positions and trade stem from changes in price differences: cash soybeans to soybean futures, soybean futures to other soybean futures, cash meal to meal futures, meal futures to other meal futures, cash oil to oil futures, and oil futures to other oil futures. The purchase of cash soybeans as they are available and hedging them in soybean futures until oil and meal is made and sold has not been profitable during nearly all of the history of the industry. Processors make or lose money on the basis of their skills in timing the commitment of plants to crushing and in basis and spread trading. Price relationships are uncertain and variable. Trading decisions are speculative. Soybean and product futures are indispensable tools for the implementation of speculative decisions.

Processors tend to go about this business conservatively. They put on crush at gradual rates and reverse crush infrequently. They rarely over-commit crush\(^3\) Short for Board of Trade.
capacity. Their open position speculation is limited. They buy soybeans as they become available and keep products merchandised well ahead of production. They prefer to keep as many of their market positions as possible in cash rather than futures.

In all of this, processors are continuously matching wits with merchants, product buyers, and with the market. It appears that they are skillful because apparent processing margins have been below cost and the earnings records of processors respectable.

**Feed Manufacturers**

The mixed feed industry presents an interesting set of variants from standard doctrine of trade use of futures markets. The use of futures markets by feed manufacturers is but one part of a total inventory management program. The ways in which they use futures markets is a further demonstration of the futility of trying to set hedging and speculation apart as opposites or even trying to distinguish between the two. Futures operations of this group of firms might best be called speculative hedging.

Much of the feed consumed by livestock is compounded from ingredients into mixed feeds. Mixed feed is consumed by all classes of livestock—hogs, beef cattle, dairy cattle, egg laying flocks, broilers, turkeys, household pets, sheep and goats, and even fish. There are two broad kinds of feed, complete feeds which is the only ration the animal is fed, and supplemental feeds which are further mixed with other ingredients such as grain at the feeding site. There are hundreds of varieties of feeds made from different combinations of ingredients.

There are several thousand firms engaged in feed manufacturing—a few very large firms, a large number of medium sized firms, and many small firms. Some are national in scope with foreign branches while others are limited to one small town operation. There are all degrees of sophistication of management, including, for our purposes, ingredient procurement and inventory management. Individual feed manufacturing vary in many respects; size, location, kinds of feed manufactured, capital structure, capacity to withstand losses, and inclination to speculate. These differences affect inventory and hedging programs in such a way that it is not possible to apply one program to all firms. Inventory and hedging programs must be individually tailored.

There are probably 115 different ingredients used in feed manufacturing. The most important of these, in terms of tonnage, are the grains—corn, grain sorghums, oats, barley, and wheat. Second are the protein supplements—oilsseed meals (soybean, cottonseed, linseed, peanut, copra), animal byproducts, fish meal, and alfalfa meal. Third are grain byproducts—wheat millfeeds, corn gluten feed and meal, distillers and brewers dried grains, soybean millfeeds,
etc. These three groups make up the bulk of the tonnage and most of the cost. The rest of the list is composed of minerals, urea, synthetic amino acids, antibiotics, etc. There is even artificial coloring and flavoring in pet foods. The primary preoccupation with ingredient cost is with corn and soybean meal. A nutritionally balanced feed can be made from different combinations of ingredients; the real concern is with carbohydrate, protein, fat, fiber, etc. balance. Thus, some ingredients can be substituted for others. Substitution is a matter of relative price. A high proportion of the industry is sufficiently computerized to work out least cost combinations on a current basis and formulae are changed as price relationships of ingredients change.

As a general rule, mixed feeds are priced on the basis of replacement cost of ingredients and price lists are kept current on a weekly basis. As with all general policies, there are variations and shadings. A few firms price on average cost and a few on actual cost. Nearly all firms fail to fully follow the extremes of ingredient price changes or lag behind them. For example, when soybean meal prices suddenly shoot up 10 or 20 percent and feed manufacturers have sufficient inventory to avoid, or nearly avoid, spot purchases, feed prices do not immediately follow the change. If the change lasts, feed prices are adjusted to the new cost structure. Some of the peaks and valleys are leveled, but not much.

The single major exception to replacement cost pricing is beef cattle feed booking. In the fall of the year cattle feed is sold for shipment scattered over several months, price guaranteed against decline; if the market price is higher on the date of shipment, the contract price prevails but if it is lower, the customer pays the market price. This is a "heads I break even and tails you win" game. It is a good sales gimmick, but is hard on the nervous systems of ingredient buyers. The way this ridiculous policy came into being is lost in antiquity. The industry as a whole deplores it but nearly everyone does it to meet the competition. There is no way to cope other than to speculate in ingredient price levels. There is a marked tendency for ingredient buyers to be long and so vulnerable to price declines rather than short and vulnerable to price increases.4

Feed manufacturers must carry minimum inventories of cash ingredients and be long some ingredients in transit to assure uninterrupted plant operations. Problems of plant operation, sales variability, quality, availability of materials, and rail billing require a basic long cash position. But for the major ingredients, this position is not large and is partly offset by the lag in the changing of

4 This probably relates to an almost universal tendency to be more willing to absorb losses resulting from price declines rather than losses from price increases. To be caught short in a rising market seems to be more difficult to explain to management than to lose money on an inventory that declines in price. Soybean processors who are long cash soybeans in a declining market quietly grind up their mistakes. Country elevators point with pride to price appreciation on long cash positions even though it may be smaller than the basis gain. It seems to take more courage to be short than long.
finished feed price lists. So long as these in process inventories are held constant at minimum levels, gains and losses from price changes are not large and tend to average out over relatively short periods. Such risks are not of major importance.

Feed manufacturers, as a group, do not hold inventory risks to a minimum consistent with adequate supplies of satisfactory quality. They accumulate much larger than minimum inventories when price increases are expected, and reduce inventories of forward contracted ingredients to minimum levels when price declines are expected. The amount of ingredient speculation varies among firms, both in absolute size of inventories and in relation to the length of time that inventories are expected to last. Whether the maximum inventory positions taken are expected to last three weeks or 12 months they are varied on the basis of price expectations. Because mixed feed is priced on replacement cost, manufacturers must take inventory profits and losses. The basic point of departure in considering feed manufacturers’ use of futures markets is that their objective is not to minimize risk but rather to control risk. Their problem is how to manage inventories so that inventory profits can be maximized and losses held to a minimum. The first phase of the problem is how to avoid being forced into unwanted speculative positions, and the second is how to stack the cards in favor of gaining as compared to losing. Futures markets are one tool in a total inventory management program. Four uses of futures markets are distinguished here; three of which are called hedging.

**Procurement.** Futures markets can be and are used to accumulate inventory ahead of the time that cash ingredients are purchased or contracted. The primary use is in connection with soybean meal and corn to cover beef cattle feed booking. But this use is not great. Ingredients are usually available on cash forward contracts in sufficient volume to cover feed manufacturers’ speculative inclinations. They prefer cash forward contracts out of scheduling and freight rate considerations. They buy futures when they judge the cash buying basis to be less favorable than is probable at a later time.

**Direct Hedging.** Direct hedging is the maintenance of an even market position by taking opposite positions in futures in the same commodity. This is the traditional hedging method employed by warehousemen and pertains to grain. It is not the total answer to feed manufacturers' needs, however, because so few feed ingredients can be covered in this way.

Direct hedging is used, principally, by feed manufacturers to earn carrying charges. This is particularly true in areas where grains are produced, but not in sufficient volume to serve all of the needs of the area. For example, corn is usually worth substantially more in the eastern states than at Chicago, but at certain times—harvest in particular—the price in the east may be no more than or even lower than the price at Chicago. At such times, corn can be hedged in Chicago futures with the nearly certain expectation of a remarkable basis gain.
Use of Futures Markets

Cross Hedging. Cross hedging is the hedging of cash positions in futures markets for different commodities, that is, short sales of corn futures against cash positions in grain by-products, oats futures against millfeeds, corn futures against grain sorghums, etc. It involves generally balanced positions and logically considers each inventory separately in the hedging program.

Cross hedging serves several purposes. First, it is used to cover commodities for which there are no futures markets. There are futures markets for only a few feed ingredients but ingredient prices are interrelated so that a short futures position in corn or soybean meal may offer protection when none other is available.

Second, it is used to cover commodities for which the existing futures markets are not liquid enough to hedge in without serious price concession, in and out. Some feed manufacturers who do not feel they can hedge effectively in certain futures markets prefer cross hedging.

Third, cross hedging is used when the direct hedging basis is judged to be unsatisfactory. For example, farmer holding may keep the price of oats high in Iowa while a large crop in Illinois and Indiana may depress futures resulting in poor prospects for basis gain on an Iowa held inventory. In such a case, new crop corn tends to be a better hedge.

There is considerable difference of opinion about the advisability of cross hedging. Some firms do quite a lot of successful cross hedging, while others prefer to carry inventories unhedged. A thorough knowledge of price relationships is essential to effective cross hedging. There are problems in addition to the one of price relationships. One is the quantity to sell against an inventory. Whether to sell pound for pound, value for value, or in some combination of the two requires a careful study of historical price behavior. Another problem is locational price differences. Relative values at different points are more erratic in feed ingredients than in grains and this erratic behavior must be recognized in placing cross hedges. Cross hedging does, however, have the offsetting advantage of offering basis profits to those hedgers who understand it. It has the major advantage of offering the opportunity of getting short something, against cash or contracted inventories, in generally declining markets—any old port in a storm.

Selective Hedging. Selective hedging might be better called selective speculation; it is a fundamentally speculative program. It is, however, less speculative than carrying open inventory positions. Selective hedging is the careful selection of inventory positions and hedging plans in order to take maximum advantage of market changes with a minimum of price risk. It involves both direct and cross hedging, as well as generally unbalanced market positions taken on the basis of expected price and price relationship changes. A selective hedging program is a blending of the entire inventory management program with all of its separate prices into one coordinated balance of market positions. This seems
to be the single hedging program that fits both the problems and the desires of feed manufacturers.

A selective hedging program should be designed to achieve several different goals. First, it must limit the total risk of the firm to the amount of loss that it is willing to take. If this involves hedging part or all of the minimum pipeline inventories, then it must provide these hedges.

Second, the program must assure liquidity of operations. Every purchasing agent must be able to make independent decisions. But the outlook for supplies, prices, and requirements changes rapidly, and he must be nimble enough in his thinking and trading to adjust to the changes. The inventory program must also be liquid enough to make it possible to adjust to changes. Taking a position and holding it for a long period without the possibility of adjustment is dangerous.

Suppose that a feed mixer buys soybean meal in October for delivery from January through March at $65 per ton. He believes that it is priced below the average for the year and that meal will cost more than $65 in January, February, and March. By December the price goes up to $75, which the mixer considers too high. He thinks the chances are the price will decline to $68. Suppose, further, that he is exactly right in his appraisal. If he carries the original position through to its conclusion without deviation, he will make a net of $3 per ton. Actually, he will have made ten dollars and lost seven. The inventory value of the meal in December is $75, not $65, no matter how archaic his accountant may be. With a flexible inventory program, he would have gotten off a sale against the meal contract and cashed the ten dollars.

A good military commander always plans his retreat before he launches an offensive. All feed manufacturers who take inventory positions get into situations that go against them. This cannot be helped. The thing to do then is to stop the losses before they get too large. One of the most important uses of futures markets is to provide liquidity; cash positions are relatively inflexible. They are tied to considerations of adequate supply, proper quality, and transportation costs. There is a tendency to get married to cash positions.

One serious inventory problem is the changing volume of feed sales. A decline in mixed feed price is usually accompanied, in the short run, by a decrease in the volume of sales, and an increase in prices by an increase in sales. Accordingly, an inventory of a given size lasts longer on a declining market than on a rising one. This is another reason liquidity is important. In a declining market, something in addition to feed sales is needed to get inventories down fast enough.

Third, a selective hedging program is designed to make profits from long positions. This is the selective part rather than the hedging part of selective hedging. The program calls for deliberate speculations after the potential gains and losses have been appraised and the gains outweigh the losses at the level at which the firm is willing to speculate.
Fourth, the program should fix profits from speculations when the balance of potential gains and losses is unfavorable. This is the hedging part.

**Corn Wet Millers**

To this point we have looked at the inventory management problems of industries whose end products are identifiable with the raw material and are priced relative to raw material prices with either the product prices dependent on raw material cost or raw material prices dependent on product values. Inventory management problems of corn wet millers are different because the end products and end product prices are less closely identifiable with the raw material and raw material prices.

By a process of soaking and centrifuging corn wet millers float the sperm away from the kernel and separate the starch portion from the gluten portion. The objective is to obtain the starch; the other two parts are by-products. A high quality edible oil is extracted from the corn germ and sold into the general edible oils market. The gluten, relatively high in protein, is made into gluten feed and meal and sold to mixed feed manufacturers.

Some of the starch is further processed into sugars. A high proportion of the corn sugars—corn syrup—are used as sweeteners in the manufacture of candy. In this market corn sugar competes with other sugar sources—cane and beet—but the price relationships are not close. Corn sugar moves into a specialized market and sells at a premium. There are specialized, highly concentrated products made from corn sugar—dextrose, sucrose, and variants of these—used in the pharmaceutical industry. Corn sugar prices, in this assortment of markets, are variable and only remotely related to the price of corn.

The principal products of the industry are starches. Chemically, starch is a highly flexible product that can be put together in many combinations. The starch industry continually changes its product list. At any given time, there are more than 80 different kinds of starches. Research and development is an important activity of the companies; some new starches are added each year and others are dropped. The bulk of the starches go into the paper and textile industries but there are multitudinous other uses ranging from pharmaceuticals, to cosmetics, to home laundry, and to absorbents for babies' behinds.

There are only a few firms in the corn wet milling industry—a dozen or so—and two firms account for more than sixty percent of the business. The firms have no monopolistic buying power in the corn market because wet milling consumes only five to six percent of the U.S. corn crop. Corn gluten feed and meal prices are closely related to the prices of competing feeds, hence cannot be controlled by the milling industry. Corn oil has specialized food uses, particularly in the polyunsaturated margarine market, and sells at a premium over the principal fats and oils as soybean and cottonseed oils and lard. Its price
moves up and down generally with the fats and oils market, but the size of the premium is variable. Wet millers can have but little control over the corn oil premium because it is a by-product and its supply is uncontrollable.

There appears to be industry leadership in starch prices. Leadership is neither clearly defined nor specific. This is partly the case because the industry must be meticulously circumspect in observing antitrust regulations. It is also partly the case because the industry leaders are independent and competitive, continually contesting for a larger share of the market. Nor are the smaller firms content with the table scrapings that might be allotted them in a monopoly industry. More importantly, the weakness of leadership is the result of product quality competition. Product innovation and merchandising programs are important determiners of market share and individual company returns relative to the average price of starch.

The net effect of all of this is a set of prices of the various starches that is directly variable with the price of corn when the two sets of prices are compared over fairly long time spans. But the price of starch is sticky relative to the price of corn. Company price lists are understood to be good for fairly long time periods and the full amount of fluctuations in corn prices never get into starch prices. Starch is not sold on firm forward contracts but the effect is the same. In periods of rising prices, the informal forward commitment appears to extend about three months. But in declining markets, the price of starch is more responsive so that protection extends only about thirty days.

This, then, is the context in which the inventory managers of wet millers must operate. They attempt to acquire raw materials at an average cost lower than the average of spot corn prices and at an average less than their competition, and attempt to sell the byproducts, gluten feed and meal and corn oil at higher than the average of market prices. If they are not long, they are short. They are short by the amount of the understood starch price protection and they are shorter in rising markets than falling markets. When they are long corn against informal starch commitments, they are net long gluten feed and meal which is generally sold for prompt shipment and they are long corn oil which is also generally sold in spot markets. At any given time there is an inventory of corn that represents a minimum price risk or zero market position. The precise size of this position is variable and difficult to calculate; it is by no means clear that all, or most, wet millers make such a calculation.

Wet millers own varying amounts of storage space for corn. Generally, those with storage space can accumulate cash inventories and these inventories often amount to more than the informal starch commitments. Those without storage space can do a moderate amount of inventory accumulation in cash forward markets. Inventory accumulation to fill storage space is a separate game from inventory accumulation for processing. It is geared to corn availability and corn basis. The internal accounting system usually treats elevator operation sepa-
rately from corn processing. Use of corn futures in connection with the elevator is the same as that in the operation of interior and terminal elevators. The usual futures position is short.

The use of futures in inventory procurement is simple. They establish a long position equal to the estimated size of the starch commitment and vary its size as their estimates of the starch price commitments vary. They then vary the size of this position on the basis of the extent to which they are willing to assume price risks and their expectations about the price of corn. Position parameters are set by company risk policy. They vary from company to company; some are quite narrow with little room for exercise of speculative judgment while others range up to several months requirements.

Two things should be especially noted. First, they grind up their mistakes. When they accumulate unprotected inventory that subsequently goes down in price, the result is reduced processing margins resulting from high cost of raw materials. This is a useful euphemism in making explanations to management and stockholders. Second, inventory procurement in excess of sales can be and usually is called hedging. Such is more apt to be the case in declining markets when losses are realized than in rising markets when profits are made. There is, however, an element of "damned if you do and damned if you don’t." If the rest of the industry is long in a rising market and a company is not, its profits for the year will suffer. Some indeterminable element of speculation is forced on individual companies by inventory practices of the rest of the industry. But companies are well advised to recognize this speculation for what it is and make deliberate speculative decisions, keeping the estimated industry position in mind.

Corn against starch positions generally result in net long positions in gluten feed and meal and corn oil. Only a limited variability in the timing of sales of gluten feed and meal is permitted by normal cash trading practices. Positions can be protected by sales of corn and soybean meal futures. Gluten feed and meal is higher in protein than corn and lower than soybean meal. Its price follows the corn price to some extent, meal to some extent, and moves independently to some extent. The variability of relationship among the three is oftentimes greater than the variability of gluten feed and meal prices. Thus, the hedging operations undertaken are themselves considerably speculative. But the variations are the result of real market forces and are subject to analysis. There are rewards to be earned by careful analysis of price differences among gluten feed and meal, corn, and soybean meal.

Corn oil can be sold on cash forward contracts but not always to the extent that corn has been purchased against starch production requirements. The alternative is to hedge in soybean oil futures when the company elects to avoid a speculative long position in corn oil. It is not a very accurate hedge because the premium of corn oil over soybean oil is substantially variable. But rarely do the
prices of the two oils move in opposite directions. Nearly always some protection is afforded. The use of soybean oil futures offers an alternative to the willy-nilly acceptance of corn oil prices as oil is produced. Whether soybean oil futures or cash forward corn oil should be sold depends upon expectations about changes in differences.

Again it should be noted that in considering sales of futures against byproduct inventories, the proper terminology is uncertain. Whether these are hedging activities or selective speculations is a moot question. They are part of inventory management.

**Candy Manufacturers**

For our last illustration, we turn to the opposite end of the commodity line—the manufacturer of finished consumer goods. Candy is a somewhat extreme illustration of the kind of inventory problems faced by manufacturers of consumer products. Consumer products are branded and not fungible and so cease to be commodities. These products typically have sticky prices. Such products as meats and vegetables have less inelastic demand schedules than branded meat products and branded, frozen vegetables. Consumers are used to and responsive to changing prices of meats and vegetables and to the branded meat and vegetable products but prices of the latter are less variable than the former. At the other end of the scale are such products as crackers, party snacks, potato chips, soda pop, candy, and chewing gum. Within limits, price is not a major factor in consumption. The price of a given brand must be competitive.

Some products sell at traditional prices and merchandising programs are tied to price. There are 15 cent candy bars and 25 cent candy bars and no prices in between. Soda pop sells for 20¢ or 25¢ in vending machines. Weather is the most important factor in soda pop sales. A change in the price of sugar is not reflected in the price or sales of brand x soft drink. The lower the price and the more highly advertised a product is, the less directly related is its price to the cost of ingredients used in its manufacture.

Candy is low in price, branded, and widely advertised. The consumer price is sticky. The only practical way to vary the price of a candy bar is to vary its size. This requires repackaging and takes considerable time. Candy manufacturers sell into a fixed price market.

The principal ingredients in candy manufacture are sugar and chocolate. Sugar prices are closely related to raw sugar prices and chocolate prices to cocoa beans. Both of these trade in world markets and their prices are highly variable. Candy manufacturers buy in variable price markets.

In planning their operations candy manufacturers must make assumptions about the finished product market. For example, one may conclude that he must make a candy bar that will sell in vending machines for 20 cents or the public
won’t buy it. He has his work cut out. He works backward, estimating his necessary expenditures for selling, overhead, packaging, and manufacturing cost. He now knows what he can pay for ingredients and still make money. If ingredient prices are below this level all is well. But if they are above he must form a judgment about their course in the future. If he expects them to forever remain too high, he must go back and adjust his operation—probably adjusting the size of the candy bar. But if he expects eventual price reductions he can wait to purchase, providing his inventory position is large enough to permit waiting.

The manufacturer must form opinions about market prices—know the cost parameters within which he can operate and know what his actions will be if certain things happen or do not happen. No matter what he does he is taking a speculative position—a short one by not purchasing his requirements for the selling season and buying hand-to-mouth or a long one if he covers his total requirements.

Two different approaches can be taken to this speculative problem. He can treat the acceptable, backed-off, ingredient costs as a reference point and his average cost objectives. As prices are below, he accumulates, and the farther they go below the more he accumulates. As prices are above he uses up inventory and the farther they go above, the farther he lets his inventory run down. It is possible to let inventories go below zero by selling cocoa and sugar futures. As he is forced to buy the cash commodities for use, he sells futures and waits to buy them in until the price goes below the reference point.

The second approach is to speculate without the bias of the profit reference point. In this case the purchasing agent’s objective is to buy at the lowest average cost that his skill as a speculator permits. He builds inventory as he expects the price to increase and liquidates inventory as he expects the price to decline. The only thing that separates him from a pure speculator is the limitation imposed on him by the ingredient requirements of the firm. He must speculate, at a minimum, in an amount equal to plant requirements. His speculation, as a purchasing agent, is limited to positions no larger than plant requirements. As he goes past this point he changes identity from purchasing agent to speculator. This isn’t a tight limitation. All he has to do to rationalize an even larger position is to project an indefinite life of the company and extend farther into the future.

The first approach has the implicit assumption that the prices of ingredients must finally depend upon the price at which candy can be merchandised and will finally return to this equilibrium level. This assumption is of questionable validity, particularly within any reasonable time span. Sugar and cocoa are used in products other than candy. Their consumption is world-wide so that the demand for the products of one company is not closely related to total demand. Supply conditions are highly variable and change over long periods of time. Periods of over-supply or under-supply can and do last for years. It would thus appear that the second approach has greater merit.
What do these people really do? Some, and probably only a few, beg the question and buy hand-to-mouth. The underlying assumption here is that there is a long run rational relationship between finished product and ingredient prices and that they cannot do a better (and perhaps worse) job of speculating than the market as a whole.

In practice, most purchasing agents appear to combine the two approaches. There is a great temptation to extend a profitable price forward and to extend it a long way forward when it is very profitable. But this is conditioned by price expectations that are formed independent of the need to acquire inventory. Some buyers are more oriented in one of the two directions than others. There is no way to judge which is the more successful but logic suggests that buyers whose price forecasting is not encumbered by nagging thoughts of the need to cover requirements get the better of the contest.

The extent of forward cover varies greatly by companies. Some limit maximum inventory to a season’s requirement and keep a minimum of three months ahead. Others go much less than a full season at a maximum and let inventories run below three months. There are those hardy souls who will reach three years out or come in to as little inventory as three weeks. Company policies tend to be established in terms of time cover—a minimum below which inventories are not allowed to fall and a maximum beyond which they may not extend. There is a strong bias toward the long side of the market—net short positions rarely exist.

Positions in cocoa and sugar are taken in both cash and futures. Most cash trading is done relative to futures. Logistical problems of quality, plant supply of multiple plant firms, storage, and transportation are solved by basis operations when the best logistical solutions do not precisely coincide with the desired ownership position. But to discuss these would be redundant of early basis trading discussions. The basic inventory positions are taken in futures, either directly by the purchasing company or by the merchant who sells cash forward.

Some Generalizations

The three chapters, 10, 11, and 12, comprise a fairly long list of illustrations of kinds of uses made of futures markets by firms in the commodity trades. In the context of the total of kinds of activities in the commodity trades it is a short list. The list is incomplete in that it treats only with physical commodities and leaves out of account the growing list of strictly financial instruments for which there are futures markets. Some generalization is worth attempting.

First, the description is a continuum of complexity from the simplest equal and opposite, intracommodity, risk aversion hedge to sophisticated management of price relationships, risk exposure, and capital. The world of use of futures in connection with commercial operations is tremendously complex. It defies

5 For a more completely and more specifically described treatment of commercial use of futures markets see Arthur, Henry B., *Commodity Futures as a Business Management Tool*. Graduate School of Business Administration, Harvard University, 1971.
classification and simplification, for the world of commodities and commodity prices and price relationships is complex and continually changing. There is room within it for playing the most intricate of games. The games are fascinating to the people who play them and the skill with which they are played is of major importance to the success of firms that deal in commodities.

Second, all of the activities treat with price risk exposure and involve objectives relating to the management of risk exposure to levels consistent with growth and earnings objectives of companies. In the main, the activities are toward the reduction of risk exposure from levels that would prevail if the firms were operated in the same way without using futures markets. In a broader sense, the activities involve the management of capital to secure maximum use of capital in firm growth. The use of futures in risk reduction frees capital that would otherwise be needed to absorb variations in equity for use in expansion and development in other lines and gives firms access to low cost capital markets. These things are all illustrative of the notions advanced in chapter 7. Futures contracts are financial instruments.

We have now progressed to the identification of still another definition of hedging: To hedge is to use futures contracts in managing risk exposure associated with commodity ownership and commitment and with variable price relationships among commodities and related commodity products to levels consistent with profit maximization and/or profit regularization and with capital preservation and expansion.

Third, futures markets contribute to the efficiency of the production, processing, and marketing processes of commodities. They enable the more effective use of capital and free up other activities from the constraints that would otherwise be imposed by risk exposure. Over time the number of industries and firms within industries that have found the use of futures desirable in the interest of growth and increased efficiency and necessary to meet competition has increased. The growth of futures markets since 1960 is highly suggestive of a need for firms to increasingly use futures markets in times ahead. Futures markets are institutions that promote the extension of competition in the economic process.

Fourth, there are some central considerations that firms contemplating the use of futures should recognize. The use of futures is unique to industries and to firms within industries. Every individual use must be adapted to the problem context within which it is placed. There are very few standardized applications.

Satisfactory results in futures markets operations can be obtained only by persons with experience and knowledge in markets. The use of futures is complex so that not only is knowledge needed, but also judgment, and judgment comes not only of knowledge but from experience. The use of futures is subject to scientific scrutiny and application but there are major elements of artistry because the world of commodity prices is infinitely intricate and continually changing.
There must be a corporate philosophy and policy established. The objectives of the use of futures must be clearly understood and the constraints that are placed on people charged with operations articulated.

Finally, the commercial need for risk management and capital preservation and expansion increases as firm size and industry complexity increases. The need for futures operations increases with scale and sophistication.