



HOW PRICES ARE DETERMINED

Agricultural Extension Service
The Ohio State University

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PART I

How Prices In General Are Determined

By Ross Milner¹

THE PRICING SYSTEM IN THE UNITED STATES

This bulletin explains how prices are determined in our country. Each country differs in the amount of control its government exercises over prices. Free enterprise countries exercise the least governmental control; socialistic and communistic countries, the most. In the United States, people, not the government, determine most of the prices of goods and services. However, there are notable exceptions to this, for example:

1. Prices of postage stamps are determined by Congress.
2. Railroad freight rates are subject to approval by the Interstate Commerce Commission.
3. Prices of many products have been set by the government during wars.
4. Minimum prices were established during the great depression of 1929-1933. This action was later declared unconstitutional by the U. S. Supreme Court.
5. Prices of some farm commodities are supported by the U. S. Department of Agriculture. Although such supports do not set the price, in some instances they have a large influence in determining prices.
6. Steel prices were not increased in 1962 at the insistence of the executive branch of government.
7. The Department of Justice and the Federal Trade Commission have influenced prices in numerous convictions of price fixing.

During our national history, the Government has increased its role in price determination. Its participation includes price setting and price influencing.

However, the *great majority of goods and services are still priced by the people*. This bulletin discusses how people determine prices of goods and services.

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THE ROLE OF PRICES IN OUR AMERICAN SYSTEM

Whenever the people of a nation are free to quote prices and to accept or reject them, prices have a dynamic and vital role in determining what people produce and what they consume.

Prices have two functions in buying and selling:

1. *To guide consumers in buying.* This includes what, how much and where individuals will buy, what size, what grade, and what quality they will buy, and how it will be processed, transported, and packaged.
2. *To guide producers and suppliers in providing goods and services.* This includes determining what individuals will produce, what quality they will produce, what resources they will use, and the time, place and in what form they will provide the goods or services.

Prices, then, convey information between consumers and producers. For example, if consumers want large potatoes, simply urging and coaxing will have little or no effect on the size producers grow. But, an increase in price of large potatoes will cause growers to produce more large potatoes.

Reasons for keeping prices free to respond to the wants of consumers was clearly demonstrated in World War II when the prices of many products were fixed. Also, the production of these products was so restricted by the government that the entire output would sell at the fixed price. In this situation, production tended to shift to less satisfactory grades and qualities. Furthermore, there was little incentive for producers and suppliers to develop and provide new and better products. Thus, with fixed prices, they could not accurately reflect the wants of consumers. Progress in satisfying these wants was interrupted.

WHY WE BUY AND SELL

Buying and selling in the U. S. and other free countries is carried on for two purposes. These are:

1. *To get satisfaction from goods and services that people buy for consumption.* Consumers have many, many wants which they hope to satisfy with purchased goods and services. Most people have too few resources to buy everything they want. They have to pick and choose and forego satisfying some of their wants. A child at the candy counter demonstrates this choosing and foregoing as he tries to make his nickel buy as much satisfaction as possible. As he grows older, he will try to satisfy his wants. He will have more resources but still not enough to satisfy his growing wants. Both the poor and the rich face this scarcity of resources to satisfy wants, because as riches increase, wants also increase. So most consumers, regardless of their wealth, buy to satisfy some wants but delay or forego buying to satisfy others.

Individuals and families differ greatly in their willingness to defer buying. Many families buy more than they have the cash to pay

for by using installment plans or other forms of credit. Others save money and resources so that they can buy more goods or services at a later time. Both types of consumers are attempting to satisfy their special set of wants as much as they can with the resources available to them. One family may be choosing between rice and beans, another between color television and a boat, and still another between a house and a larger insurance policy.

Consumers buy to satisfy wants, whether these are for food, clothing, shelter, comfort, convenience, prestige, health, happiness, education, recreation, culture, or security.

No two people have exactly the same wants. This is also true of families. There are countless ways in which one person's wants may differ from another. The combined total of these wants of consumers creates the market for a city, a sales area, a nation or the world.

Thus, to satisfy these consumer wants, the tasks of financing, producing, grading, processing, storing, packaging, transporting and merchandising become all the more fascinating and challenging.

2. *The second reason for buying and selling consists of the hope of receiving a reward for providing the goods and services.* These rewards are called profits.

Although there may be several reasons why people provide goods and services for consumers, the primary incentive is the desire for profits.

Profits are what is left over after price is multiplied by the volume sold minus the costs and expenses involved. Thus, prices have a direct relationship to profits.

Profits are usually considered for a period of time not just the profit from a single sale. There are exceptions, such as a one time sale, for example, when a person sells his residence—at the highest price he can get. But, an established owner or firm, hoping for repeat sales, must develop a reputation for fair prices. For example, most gas station operators in a storm-struck town would not charge the highest price they could get for the last set of tire chains. The urge for profits, over a period of time, then, greatly influences the prices quoted.

Sellers of goods and services know that if their prices are lower than necessary to move the product, they will sacrifice profits. Also, they know that if prices are too high, they will lose volume—and thereby profits. This will occur because of rivals who are competing for the business.

INFLUENCE OF COMPETITION ON PRICES

Competition is defined as the effort of two or more parties, acting independently, to secure the patronage of a third party by offering the most favorable terms.

Competition is the chief power that causes firms to sell at reasonable prices, provide what consumers want, develop superior products and provide

better services. Each member in an industry knows the force of his competition. Supermarkets located in a shopping center are an example of this force, with each store knowing that its business life will be short unless it can make a successful appeal for customers to buy.

Generally, when one sells at an unreasonably high price, he soon finds his volume of sales is declining, because some competitor is selling a similar product at a lower price and taking away his business. If there is no immediate competitor, there will likely soon be one. This is true because our country has comparatively large amounts of capital from which the owners are trying to get as large a return as possible.

Our free enterprise system provides for legal "right of entry," which means that a new competitor is permitted to start a competing store or business. He will likely do so, if the profit opportunity looks promising enough. As a result of such competition, the firm which has temporarily enjoyed high prices soon has too small a volume to make a maximum profit—no matter how high it sets the price. In fact, if the firm raises its prices still higher, its profits may decline even more.

Thus, competition or the threat of competition strongly tends to keep prices "reasonable."

Competition may be imposed by:

1. Existing firms.
2. Prospective firms who will enter provided the opportunity for profits is promising enough.
3. Products that may be substituted including some yet to be developed or invented

Although market power is difficult to define, it relates to a current competitive advantage which a person, firm, or group of firms may have over others.

When market power exists, there is, of course, restricted competition within the industry. This does not mean that there is also restraint of trade, because the two terms express different degrees of limitation. Competition with no restriction at all is referred to as perfect competition. There probably is no perfectly competitive market because such a market would have all the following conditions:

1. So many buyers and sellers of a product that no one could singly influence prices. Individual farmers are in this classification; so are individual consumers.
2. Complete information about the supply and demand known to both buyers and sellers. This is the justification for government estimates and publications on supplies and demand for products—such as crop and livestock reports. They attempt to give both buyers and sellers more opportunity to know about the market.

3. Everyone offering the identical product. All No. 2 Soft Red Winter Wheat is considered identical. Retail milk, however, even from the same spout but with different container labels may compete as though the products were different. There are many ways to achieve actual or apparent differentiation of products.
4. No restrictions on buyers and sellers except for the protection of private property and the right of contracts. Licenses and franchises to sell are examples of restrictions.
5. Right of entry into the market.

Thus, it appears that competition is nearly always restricted. The degree of restriction varies greatly from one industry to another. The source of restriction within an industry largely determines its use and its effect on prices.

Some sources of restrictions in competition include:

1. Eliminating competitors. Examples are merging of businesses or operating a firm so successfully that others are not effective as competitors.
2. Patents. The government rewards those who are granted a patent the exclusive use of it for 17 years or the right to charge competitors a fee for its use during that period.
3. Licenses to sell. When required by cities and states, licenses may limit the number of firms or persons permitted to do business.
4. Sales franchises. Manufacturers of many products, including automobiles, farm machinery and other equipment commonly limit the number of franchises they issue to sell their product.
5. Branding of products. When coupled with advertising, the branded or labeled product may convince buyers that the product is different and superior to others.
6. Good will. Through effective public relations, the seller may develop loyalty in the customers.
7. "Fair trade laws" that enforce price maintenance. Such laws, however, may be illegal under the Federal Trade Commission.

When a firm or industry is able to restrict competition by one of these or other methods, it is said to have market power.

During our American history, Congress has attempted to improve on our completely free enterprise system by passing laws as a guard against over-restricting competition by groups of sellers or buyers. These laws are concerned with excessive stifling of competition and collusion in price setting. Examples are the Sherman Anti-Trust Act, passed in 1890, Clayton Act in 1914 and Robinson-Patman Amendments in 1936 which are administered by the Federal Trade Commission or U. S. Department of Justice. Original concepts have been extended by the judicial and executive branches of government.

Over the years, actions have been taken against many firms which have been cited for stifling competition. Firms that have been found to stifle com-

petition have been required to cease such restraints of trade. These requirements have included disposing of control of part of the assets, selling facilities, or ceasing to fix prices through collusion with other firms in the industry.

Competition is not a simple thing. A weak competitor is not considered to be useful to a society. On the other hand, there are some who consider a competitive giant to be a menace. Others say the giant is able to produce better products at lower prices. Members of courts of law differ in their individual beliefs about competitive cases, and there is seldom an unanimous decision.

Producers and manufacturers obtain market power when they determine the quantity needed and are able to restrict production to only the quantity that will sell at a profitable price. Some groups can largely control the total quantity their members produce; others have been unable to do so. The latter group includes farmers. Examples of producers who effectively determine and partially control production are: crude oil producers, oil refineries, automobile manufacturers, and countless other industries.

HOW SUPPLY AND DEMAND AFFECT PRICES

Supply and demand, along with costs of production and marketing, are the primary determiners of prices. Nearly everyone agrees that supply and demand play a very large role in determining prices. This general agreement exists even though the word "supply" commonly has two meanings and so does the word "demand." Many people think of supply as merely the quantity of a product on hand. Students of prices think of supply as:

1. Quantity of a product on hand, *and*
2. Quantities of the product that would be produced in response to prices at various levels.

The latter is sometimes referred to as a supply schedule for the product.

Of course, production tends to increase as prices rise and to decrease as prices decline. The supply schedule, then, is a picture of the responses which producers would make, if prices were at various levels. Table 1 illustrates a combined supply schedule and demand schedule for fig bars in an assumed trade area.

TABLE 1—Combined Supply and Demand Schedules for Fig Bars in an Assumed Trade Area

Price per Pound	Pounds of Fig Bars Per Year			
	Amount Buyers Will Take	Amount Sellers Will Produce	Excess Production	Demand Excess
\$0.50	100,000	300,000	200,000
.40	150,000	250,000	100,000
.30	200,000	200,000	0	0
.20	250,000	150,000	100,000
.10	300,000	100,000	200,000

Table 1 shows that at 50 cents a pound sellers will produce just the quantity of fig bars people in the assumed trade area will buy. At prices higher than 50 cents, sellers will produce more than buyers will take. Also, at prices lower than 50 cents, buyers would take more than sellers will produce. The 50 cent price represents what is called the "equilibrium price," because it is the highest price at which all the production will be taken.

Production of relatively few products can be changed as quickly as that of fig bars. For example, potatoes are harvested only once a year. There cannot be any production responses in terms of future supply until the next harvest. This means that for several months the supply must come from last year's production. The stocks on hand, along with the demand, largely dictate the price that will be paid until the next harvest.

When stocks are large, their owners must accept lower prices. In the search for profits (or minimized losses) an owner may continue to sell his existing stocks as long as the returns exceed only his marketing costs. Experience clearly shows that sellers respond in this manner. When stocks are large, there is less need for the last units of the product. In fact, some lower-value use must be made of them. For example, part of the last units of a large crop of wheat may have to be used for feed instead of flour. As feed, it would have a lower-value use than as flour. This, of course, causes the entire quantity to sell at a lower price. Stocks on hand affect prices of all types of sellers, including producers, manufacturers, wholesalers and retailers. For example, retailers with too large a quantity of last year's model cars must mark the price down. So must the retailer of fly screens and lawn mowers who wants to clear his stocks at the end of the season.

On the other hand, prices rise just as certainly when stocks are small. This was demonstrated in 1961 when soybean prices rose \$1.06 cents a bushel from December 15 to April 15 in response to a smaller than expected world-wide crop.

It is true of most farm products that a smaller than average production yields a larger gross return.

This fact is illustrated in Table 2 with actual production and prices of potatoes in 1954 compared with those in 1955. The smaller crop in 1954 actually returned 56 million dollars more total gross income.

TABLE 2—Comparison of Prices and Returns from the
1954 and 1955 U. S. Potato Crops

Year	Production	Price	Returns	Production Increase	Price Decrease
	Million CWT	CWT	Million	Per Cent	Per Cent
1954	220	\$2.16	\$395		
1955	227	1.79	339	3	17

Source: What Makes Farmers' Prices, April, 1959, Agriculture Information Bulletin 204, U.S.D.A.

Table 2 shows that an increase of 5 per cent in potato production in 1955 was associated with a 17 per cent decrease in price. It re-illustrates the fact that when production changes, prices change.

Farmers and manufacturers both commonly recognize the importance of controlling production, but manufacturers have had relatively more success in controlling production.

During 52 of the 52 years from 1910 to 1962, total annual farm output changed less than 5 per cent from the preceding year. Thus, farmers act largely independently of each other even with government assistance to effect greater control over production of farm products. There are good reasons for this:

1. A farmer knows that his individual output is so small in relation to the total production that his output will have virtually no effect on the price he receives. If he reduces his individual production, he merely reduces his total gross receipts.
2. Each farmer's production is usually sold as a part of the total supply of the product. For example, Mr. Green produces and sells beef, but it is largely commingled with other farmers' beef of similar grade. With many manufacturers, the product is differentiated. For example, only one automobile manufacturer produces and sells Brand X automobile. He has a different product and he can, by his own decision, control the production of Brand X.
3. Farmers dislike to leave part of their farm production plant idle because their fixed costs are very large in relation to their variable costs. Thus, many farm costs continue no matter how much or how little is produced.
4. A long time is required to make adjustments in agriculture. It requires a year to adjust field crops and several years to change greatly the size of livestock herds. This is important because decisions about production are influenced not only by the price received in the past, but also by the price expected in the future.

To the extent an industry can control production, it can obtain higher prices. This means that it can control the production and thereby keep prices relatively stabilized. Controlling the quantity produced, however, is not an easy matter because this would likely result in larger profits which would in turn stimulate some to produce more and others to enter.

Demand as defined by students of prices includes:

1. The total desire of individuals, firms, and government to buy the product, *and*
2. Financial ability to buy it.

The demand for a product is not known, if one knows only the amount that will be taken at any one price. We all know that more will be taken at an extremely low price and that less will be taken with each rise in price. Demand, then, consists of a picture of the amounts that will be taken at various prices. Each person has an individual demand, and the total of these individual demands makes up the demand for a group. Thus, we have a trade area demand, a national demand, etc. With each increase in price, some members of the group will buy less of the product and some will cease buying at all. The amounts that will be taken at various prices are properly called a demand

schedule for the product. A demand schedule has been illustrated in Table 1 using fig bars.

To further illustrate, let us say that we have the following demand schedule for apples. If apples are priced at \$10 per bushel, no one will buy them; at \$4, some will buy; at \$3, more will buy, and at the ridiculously low price of 50 cents, a huge quantity will be bought. Although many prices have been omitted in this schedule, it indicates what is meant by the word demand. Usually, when a person says there is no demand for a product, he means that it will not be taken at the price at which he thinks it should sell. Nearly all products have a demand, but the demand may be such that the quantity of the product on hand will move only at a low price.

The demand for a given product changes only when the components of demand change. The components of demand include:

1. *General price level.* A rise in the general price level is accompanied by a stronger demand.
2. *Incomes of consumers.* A rise in incomes means more ability to buy.
3. *Size of population.* More people must have more food, more school books, and more of everything.
4. *Tastes or preferences for products.* For example, there is a trend by people to eat more vegetables and less bread.
5. *New uses for products.* For example, additional food by-products are being developed from potatoes. This affects the demand for potatoes.
6. *Amount of promotion of products.* For example, promotion causes more people to know about a product and to want it.
7. *Substitutes.* For example, in a given season, large quantities and low prices for beef would affect the demand for pork.

Although demand may be affected in additional ways, these are probably the most important.

It has been explained that prices change in response to changes in production. This was illustrated in Table 2 with potatoes. But, prices of each and every product responds differently to changes in production. The change in price, of course, is always in the opposite direction from the change in production. Research economists have made studies of many products to determine what effect a change in production of a given product has on its price. The results of such a study by the U. S. Department of Agriculture² are shown in Table 3. From this table one may conclude, for example, that:

1. A 2 per cent increase in the *production* of eggs may result in a 6 per cent decrease in the *price* of eggs, *also*
2. A 2 per cent decrease in the *production* of eggs may result in a 6 per cent increase in the *price* of eggs.

Thus, the price is affected by the same percentage whether production increases or decreases.

²Bulletin 204, Agricultural Marketing Service, U.S.D.A

TABLE 3—The Percentage Change in Price Resulting from Each One Per Cent Change in Production—In the Opposite Direction

Each One Per Cent Change in Production	Percentage Change in Price in Opposite Direction
Commodity	Percentage
Wheat	5
Potatoes	4
Onions	3
Whole Milk	3
Eggs	3
Cabbage	2
All Meat Animals	1.6
Oranges	1.6
Corn	1.5
Beef Cattle	1.2
Apples	0.8
Peaches	0.7
Peas	0.4
Strawberries (estimated)	0.3

Source: *What Makes Farmers' Prices*, April, 1959, Agricultural Marketing Service, Agriculture Information Bulletin 204, U.S.D.A.

Although price responses to production changes will likely not recur exactly as shown in Table 3, the data give a good indication of the production-price relation of these commodities. Also, it shows that prices of each product react differently to a change in production. This raises the question, "What causes these variations in price responses among products?" The answer lies in the differences in demand which people have for changed amounts of each of the products. For example, it requires a very large change in the price of salt to change the quantity of salt people will eat. We insist on eating the usual amount of salt, but any more than that is too much. On the other hand, a small change in the price of strawberries results in a large change in the quantity people will buy. These variations are measured by what is called "demand elasticity." Every product has its demand elasticity.³ Because it requires such a large change in price to affect the quantity sold, salt is said to have an inelastic demand.

Products with an inelastic demand have several characteristics in common. So do products with an elastic demand. These are shown in Table 4.

TABLE 4—Characteristics of Products with Inelastic and Elastic Demands

Characteristic	Product with Inelastic Demand	Product with Elastic Demand
Kind of want	necessary	luxury
Available substitutes	few	many
Cost of a single purchase	usually small	often large
Desire for additional units	small	large

³Fourteen farm commodities are listed in Table 2. Of these the first 10 have an inelastic demand; the last 4, elastic. A product has an elastic demand when a percentage change in price results in a larger percentage change in the quantity purchased. A product has an inelastic demand when a percentage change in price results in a smaller percentage change in the quantity purchased. When defined in this manner, a product has an elastic demand when it has an elasticity coefficient of more than one; inelastic, when less than one.

Referring to Table 4, salt has an inelastic demand because it is necessary, there are few substitutes, the cost of the quantity purchased is small and there is little need for additional units. Potatoes, onions, and most other farm commodities meet this description. Strawberries, on the other hand, have an elastic demand because they are a luxury product, there are many good substitutes, and there is a desire for additional units. People who eat strawberries would eat more at a lower price. Also, some people who do not eat them would do so if the price were reduced.

A small crop of potatoes as shown in Table 2 will sell for a larger total gross income than a large one. This is true of all products having an inelastic demand because the percentage increase in price will exceed the percentage decrease in production. On the other hand, a small crop of strawberries will sell for a smaller total gross income than a large one. The percentage increase in price will be smaller than the percentage decrease in production. These production-price relations are expected to continue to apply, provided year to year changes in production are no greater than they have been in the past.

Although supply and demand are primary factors in determining prices, it must be kept in mind that the actual supply and demand is being estimated by people. This means that people's opinions of supply and demand for a product determines today's prices. At best, these opinions cannot be exactly correct even though key buyers and sellers continually devote a great deal of study to the actual supply and demand. Equilibrium prices occur when both buyers and sellers have accurate and complete information. Prices adjust up and down in a continual struggle by buyers and sellers to find the equilibrium price. The "law of supply and demand" is completely effective, when traders locate the equilibrium price.

HOW COST OF PRODUCTION AFFECTS PRICES

Costs which have been incurred for producing a stock of goods on hand have little or no effect on the price at which it will sell. Once the goods are produced the supply consists of the stocks on hand until the next production. The quantity of stocks on hand and the demand for them largely dictate the price.

On the other hand, the cost of producing new goods influences the quantity that will be produced. Production will decline when producers think they cannot make a profit under an adverse relationship of cost of production to price of product. When production declines, of course, the supply declines and in turn prices rise. Thus, the cost of future production affects future prices. It is true that future production may continue temporarily even though not all the fixed costs are being recovered. The producer knows that his fixed costs will continue even with no production, and that he will lose less by continuing to produce until he can sell out or shift to the production of another product. There are many examples of this, including the decline of horse production about 1915, buggy manufacturing about 1925, and bargaining on the Ohio

canals about 1856. Prices of these goods and services declined so much that producers could not recover their future costs of production, and output either declined or ceased.

HOW TO CHANGE PRICES

Prices as already explained are determined by a set of forces. When these forces change, prices change. Commodity futures and corporation stock prices may change several times within a day. On the other hand, daily newspaper prices and city bus fares adjust very slowly. Eventually prices of even these products and services respond to the forces that determine prices.

What, then, are the forces and how can they be changed to bring about changes in prices? They are:

1. Quantity of the product or service.
2. Demand for the product or service.
3. Costs of future production.
4. Costs of marketing.

These forces have been discussed above. There are many components to supply. For example, the supply of wheat includes local, national and international stocks on hand, quantity of wheat owned by the government, the formula for determining its selling price and the response of producers in future production. Likewise there are many components to demand. For example, consumer incomes, numbers of consumers, wheat export situation, demand elasticity for wheat, trends in consumer preferences for wheat products, new uses for wheat, government price support program, and use of wheat products in the school lunch program.

Costs of future production affects prices. Generally an increase in costs of future production results in higher prices of the product. Also, a decline in production costs leads to lower prices.

Costs of marketing also affect prices. Prices generally rise, when marketing costs increase. For example, the price of bread may rise when there is a general rise in the cost of labor. Also, the price of bread may decline following a general decline in marketing costs. Changes in marketing costs must be general among competitors otherwise prices may not be affected.

PART II

Adaptations In Pricing Grain

Basically, grain prices, like all prices, are determined by the system described in Part I. However, in determining grain prices, some special adaptations are used. These adaptations are described in Part II in the form of question and answer investigations.

1. Is the Price of Grain Determined by the Grain Exchange?

No. The Grain Exchange is merely a meeting place with facilities for others to buy and sell cash grain and futures contracts. The Exchange itself does not determine prices because it does no trading.

Let us follow the buying and selling of a futures contract. Suppose that Mr. Black decides to buy and sell futures contracts in the hope of making a profit. He calls a grain broker located in a city near him and tells him he wants to buy a wheat futures contract. The broker does not own wheat futures contracts and neither does the Grain Exchange. So the broker must find some one who wants to sell a wheat futures contract. Usually there are many people who want to trade in these contracts. They are located all over the United States and to some extent in many foreign countries. These people also call their brokers and place their orders to buy or sell.

Let us say that Mr. Green has placed an order to sell a futures contract. He, too, wants to make a profit, but he decides the price is going down so he wants to sell. Through Black's broker and Green's broker, Black buys a wheat futures contract from Green. Black does not talk to Green, in fact, he does not know that it was Green who sold him the futures contract. Their brokers arranged the deal and the clearing house located at the Grain Exchange performed the details of transferring the finances. It was Black who bought the wheat futures contract, and it was Green who sold it, not the Grain Exchange. It is important to note that Black could not buy at the price unless there was someone like Green who would sell at that price.

Now let us compare the basic similarity of buying a house. Suppose that Black wants to buy a house. Again he goes to a broker, this time to a real estate broker. The broker knows that Mr. White wants to sell his house. So the broker gets Black and White together. Black likes the house and wants to buy it. Black and White haggle over the price and finally arrive at a price that is acceptable to both. They sign a contract and Black makes a payment to bind the agreement. Up to this point, Black has actually made only a futures contract to buy the house.

Black's purchases of the house and wheat contracts are basically the same. In practice, Black will likely not sell his house contract, he will pay the balance and accept ownership of the house. He will either accept ownership of the wheat or sell the futures contract, but he will likely sell the contract.



Chicago Grain Exchange futures being recorded at the Toledo Board of Trade.

These choices do not affect the price which Black paid for either the wheat futures or house contracts.

Prices of the wheat futures and the house were determined when the contracts were made. Also, they were determined by buyers and sellers. Thus, the Grain Exchange and the Real Estate Board merely assisted buyers and sellers in trading.

The term, futures, is commonly used when referring to a futures contract. A grain "futures contract" is a contract to deliver or receive a specified quantity of particular grain during a specified period of time in the future. The responsibility of delivering or receiving the grain can be satisfied by closing out the contract before the delivery month arrives by a new transaction in the futures market opposite to the original transaction.

2. How Do Futures Prices Influence Cash Grain Prices?

Futures prices are used as a guide in determining the value of cash grain. Each time a futures is traded, it reflects a current appraisal of the supply and demand for the commodity at a selected future date. As prices rise and fall, they reflect buyers and sellers opinions of changes in value of the commodity. These changes in value of grain for future delivery usually result in similar changes in prices of cash grain for immediate delivery.

Prices of futures and cash grain are seldom identical because the conditions of sale are not identical. Suppose we are comparing futures prices at the grain exchange at Chicago with cash grain prices also at the grain exchange at Chicago. The place of delivery is identical, but the dates of delivery differ. Since futures prices are for grain to be delivered at a later date, there are carrying costs. These costs consist of storage, interest, and insurance. Also, there is a difference in grade specifications.

When a person has made a futures contract to sell, he may close out the contract by delivering the grain or by a buying transaction in futures. If he chooses to deliver grain, he has some choice in the grades and classes of grain he may deliver. Prices are adjusted for grade and class differences. Nevertheless, a processor who has bought futures dislikes to accept grades and classes of grain of the seller's choice. Finally, cash grain prices at all locations except Chicago differ from futures prices at Chicago because of differences arising from location.

Futures prices, then, are used as a guide in determining value and changes in value of cash grain for immediate delivery. Terminal elevators, processors and commission merchants all over the country adjust their cash grain prices to changes in futures prices. A cash grain bid is, therefore, the futures price plus or minus the "basis" (difference in the two prices).

The basis is the price difference over or under a designated future at which a commodity of a certain description is sold or quoted.

Terminal elevators, processors and commission merchants make daily bids to country elevator clients for their cash grain. These bids are phoned or mailed each day following the close of the futures market. The country elevator, then, chooses the best bid it receives, and from this bid, it deducts a charge for its services which it calls the *margin*. This becomes the price the country elevator will quote growers unless it has a greater demand for the grain within the local area. When the local demand exceeds the demand outside the community, the country elevator will likely quote a correspondingly higher price to growers and then sell grain within the area.

The price of grain, however, is about the same all over the United States except for transportation costs. This means that grain will start moving into a community with higher prices whenever the price disparity exceeds the cost of transportation. This situation is further explained in the answer to Question 5

3. Is It Possible To Sell Grain Before It Is Harvested?

Yes. In some areas many growers sell part of their expected production while the crop is still growing or even before it is planted. This is called *forward selling* because the sale is made and the price is established before delivery is made. Thus, the grower knows at the time the forward sale is made what price he will receive when he delivers the grain. Usually, several transactions are made in response to a forward sale. While making these transac-

tions, the risk of an adverse price change is being transferred from one person to another. Following is a typical set of transactions involved in a forward sale by a grower.

1. Grower forward sells to a country elevator
2. Country elevator forward sells to a terminal elevator
3. Terminal elevator sells a futures contract for a like quantity of grain. By forward buying the cash grain and simultaneously selling a like quantity of grain futures, the terminal elevator has placed a hedge on the transaction. *Hedging* is defined as a means of protection against inventory loss by offsetting a purchase or sale of cash grain by a counterbalancing sale or purchase of an equivalent amount of futures. Hedging is practiced by many segments of the grain industry including farmers, country elevators, terminal elevators, processors, millers, bakers and exporters.
4. Speculator buys the futures. In making this purchase he is carrying the risk of an adverse price change involved in the grower's forward sale.
5. When the terminal elevator eventually sells the grain, it will, at the same time, buy a like quantity of futures. Thus, the terminal elevator has bought and sold the cash grain, also, it has sold and bought futures. The terminal elevator now owns no cash grain from its original purchase of the forward sale by the grower, and it has no "position" in the futures market. A position exists when one has an open commitment in the futures market.

Hedging reduces the risk of loss from adverse cash grain prices because prices of cash grain and futures usually rise and fall together. In practice, over a period of time, however, prices of cash grain and futures seldom change by precisely the same amounts. It is often possible for a skillful hedger to make a profit from the hedging operation itself. This profit occurs when there is an improvement in the basis. The basis improves when the cash price rises in relation to the futures price.

4. How Does Setting the Margin Affect Price Determination?

Country elevators usually think of gross margins rather than prices. The gross margin is payment for their services plus any profit they make. The gross margin is the difference between the selling price and the buying price. The country elevator determines the price it quotes to grain growers by subtracting its gross margin from the highest bid it receives. This becomes the price it quotes to grain growers. If it finds that its competitors are bidding a higher price and getting the grain, it will likely adjust its bidding price so that it will be competitive.

In one respect, the country elevator is unlike many other buying and selling firms. Each day it receives bids from terminal elevators, processors, commission merchants, and brokers to buy its grain. These bids to the country elevators usually stand until some stated time the following morning. Each day a bid is made to country elevators by phone or card. Thus, the country

Typical daily grain quotations as posted at country elevators.

GRAIN QUOTATIONS	
WHEAT	197
NEW WHEAT CONT	175
SOYBEANS	251
NEW	227
OATS	72
34 LB TEST	
BARLEY	
EAR CORN	111 Bu
SHELLED	114 Bu
CWT	
BASIS 15 ⁵ MOISTURE	

elevator operator knows its selling price, except during the hours of trading at the grain exchange. (Example 9:30 a.m. to 1:15 p.m. exchange time.) This procedure shifts much of the risk of price change from the country elevator and thus reduces its costs of selling and probably the gross margin it takes. It was pointed out in discussing Question 3 that risk is a cost of buying and selling. Here, again, the risk has not been eliminated, it has merely been transferred to the person who buys from the country elevator.

Determining the price to the farmer by setting the gross margin does not give the country elevator any special manipulating power. Competition is as keen in setting margins as it is in setting prices. The country elevator knows that a large volume is important in making a profit. Also, it knows that competition will prevent it from getting a large volume if its margins are too large. If it finds its volume is declining because farmers are selling to competitors, it will likely change its margins. Margins vary in different areas of Ohio. Generally, country elevators in the largest grain producing areas take the smallest margins. Research investigations show that this is true.⁴ In such areas elevator costs are usually lower per bushel of grain handled. For example, facilities at the elevator handle more bushels, also, more bushels are handled per employee. Competitors are present in all areas but they, too, have higher costs and must take larger margins in areas where volume is small.

A study was made of the actual margins taken for handling grains in Ohio in 1958.⁵ These margins are shown in Table 5.

⁴Price Spreads for Corn and Oats, Research Circular 55, John W. Sharp and Harold J. Ecker.
⁵How to Build a Better Business, Extension Bulletin MM 173, Ross Milner.

**TABLE 5—Gross Handling Margins Taken by Country
Elevators in Ohio**

Kind of Grain	Average Gross Margin
	Cents per Bushel
Corn	\$0.08
Wheat	0.09
Soybeans	0.08

Margins in areas of Ohio range up and down from these Ohio averages as explained above.

**5. Is the Price of Grain the Same All Over the United States
Except for Transportation Costs?**

Almost. This observation helps one to better understand how grain prices are determined. Grain merchants keep in close touch with prices at many locations. Whenever the price "gets out of line" in one location there is a tendency for grain to start moving to or from that area. It must be kept in mind that in Eastern U. S., rail transportation charges on grains are lower per mile from west to east than from east to west, and they are lower from north to south than from south to north. Also, in many areas, there are several types of available carriers, each with different transportation charges.

As this is written, the prices of corn at selected terminal markets are shown in Table 6.

**TABLE 6—Actual Prices of Corn at Selected Terminals
No. 2 Yellow Corn F.O.B. Track Per Bushel**

Terminal City	Prices		
	Date of Writing	Six Months Before	Twelve Months Before
Chicago	\$1.13	\$1.14	\$1.11
Kansas City	1.14	1.10	1.09
St. Louis	1.11	1.14	1.07
Toledo	1.09	1.13	1.07
Omaha	1.08	1.05	1.05
Minneapolis	1.04	1.02	1.02

Source: Grain Market News, Grain Division, Agricultural Marketing Service, U.S.D.A.

Admittedly, established price supports at each market complicate an analysis of prices at these six markets. There is not much difference in prices at any of the cities. The differences are less than the cost of transportation from one city to another.

At each of these cities there is a large volume of production, processing, and consumption. When a change occurs in supply and demand at one city it results in a change in the relation of prices in other cities. For example, on the date this was written, prices were highest at Kansas City, but six months earlier prices were highest at Chicago, St. Louis, and Toledo. Let us suppose that some year the corn crop fails in the Toledo area, and it becomes profitable

to ship corn from St. Louis to Toledo. In this situation, the Toledo price will actually become the St. Louis price plus the cost of transporting corn from St. Louis to Toledo. The price of grain would be the same except for transportation costs. Prices at each location are adjusted by local supply and demand and transportation costs.

6. Is the Seasonal Increase in Price Equal to Storage Costs?

Yes, when several years are averaged, the seasonal increase in prices is roughly equal to the accumulated storage costs. Seasonal changes in prices of wheat, corn, and soybeans are shown in Tables 7, 8, and 9. The five year average increases in prices of wheat and corn closely follow the additional storage costs as the season advances. Average increases in soybean prices are greatly affected by the unusually large price increases in the 1960-61 marketing year. This situation is explained later. Typically, prices increase until the approach of production of the next crop. Production from the new crop arrives with no accumulated storage costs and with a new supply and demand situation. The price tables show that seasonal price changes are distinctly different for each of the five years, that prices from month to month do not increase uniformly, and that the month when prices will be the highest is not very predictable.

If every day throughout the marketing season, buyers and sellers had completely accurate information about supply and demand, prices would likely advance in an amount equal to the accumulated increase in storage costs. It was explained in Part I that actual supply and demand are not known. They are, therefore, only estimations made by people. At best, these opinions cannot be exactly correct even though key buyers and sellers continually devote a great deal of study to the actual supply and demand. This incomplete knowledge of actual supplies was very large in 1960 with respect to soybean production in Asia. In the U. S. it was not known until December that production in Asia was so small. As a result, prices in Ohio rose \$1.06 per bushel from December 15, 1960, to April 15, 1961. Because of "imperfect knowledge," prices move up and down in an effort by buyers and sellers to find the equilibrium price (the highest price that will move the supply). The equilibrium price was described in Part I under the topic, "How Supply and Demand Affects Prices." If the equilibrium price were actually known throughout the entire marketing season, the price on each day would be the equilibrium price less the cost of storage from that date to the end of the season.

People in the United States have large amounts of available capital which can be used to buy and store grain—provided the venture offers profit opportunities. In years when people think it will be profitable to store grain, they compete more aggressively for the supply at harvest time, so they will have the quantity they wish to store for resale at a later date. This results in an increase in the price at harvest time. At harvest time, buyers tend to pay the price at which they think they can sell the grain later minus the storage costs. Storage costs as used here include some allowance for risk due to possible adverse price changes and a nominal profit.

By contrast, in Korea, where capital is very limited, grain prices may eventually advance by as much as three times the price at harvest time. In Korea, interest costs are high, but not high enough to account fully for so great a seasonal increase in prices.

Some years, the quantity of grain offered for sale at harvest time exceeds the quantity that can be stored locally or sold outside the community. The huge corn crop in 1960 is an example. That fall, bins were all full and some railroad cars were rented and held on sidings as additional temporary storage. Prices were reduced to compensate for the increased additional handling and storage costs.

During most years prices will rise, but by an unpredictable amount. If one could correctly guess in what years it will be profitable to store and what months prices will be highest, he could profit by deciding each year whether or not to store. Actually, his guessing or knowledge of actual supply and demand must be better than average, if this plan is to work successfully.

Seasonal and monthly price changes are shown in Tables 7, 8, and 9 for wheat, corn and soybeans.

**TABLE 7—Seasonal Changes in Wheat Prices in Ohio
Based on F.O.B. Bids to Country Elevators in Central Ohio
for Immediate Delivery**

July Price	Monthly Price Change From July					5 Year Average \$1.85
	1957-58	1958-59	1959-60	1960-61	1961-62	
\$2.04	\$1.81	\$1.81	\$1.74	\$1.85		
Month	Increase in Cents per Bushel From July					
August	4	— 9	0	3	7	1
September	8	— 5	4	7	7	4
October	10	3	9	16	10	10
November	12	7	19	20	16	15
December	13	7	17	24	18	16
January	11	6	19	29	15	16
February	7	11	15	27	14	15
March	10	16	22	26	18	18
April	14	13	24	9	23	17
May	10	8	19	7	31	15
June	12	0	— 5	7	26	8

Monthly bids are those nearest the 15th for Number 2 Wheat. Prices quoted to farmers by country elevators are the above prices less the margin taken by the country elevator for its marketing services.

7. Does the Seaway Export Route Affect Ohio Grain Prices?

Yes, Ohio has always had routes over which grain could be moved to foreign markets. However, until the seaway was developed, the available routes were more costly than those from some producing areas of the United States. As a result, other areas got nearly all of the export business. Very little grain was shipped from Ohio to foreign markets. Cash grain produced in Ohio was nearly all sold in domestic markets.

Development of the St. Lawrence Seaway resulted in a reduction in grain transportation costs from Ohio to export markets. Storing facilities,

**TABLE 8—Seasonal Changes in Corn Prices in Ohio
Based on F.O.B. Bids to Country Elevators in Central Ohio
for Immediate Delivery**

November Price	Monthly Price Change From November					5 Year Average \$1.08
	1957-58	1958-59	1959-60	1960-61	1961-62	
\$1.18	\$1.11	\$1.09	\$0.93	\$1.09		
Month	Increase in Cents per Bushel From November					
December	1	6	0	9	2	3
January	4	6	5	16	— 2	4
February	4	7	4	21	— 2	5
March	0	10	7	21	1	8
April	13	18	11	14	3	12
May	11	16	10	20	6	13
June	17	17	8	15	2	12
July	15	14	7	19	1	11
August	17	12	6	18	1	11
September	7	3	3	13	— 2	5
October	1	— 8	— 6	13	— 4	— 1

Monthly bids are those nearest the 15th for Number 2 corn. Prices quoted to farmers by local elevators are the above prices less the margin taken by the country elevator for its marketing services. Prices during the 1961-62 marketing season were greatly influenced by the Government program of selling its owned stocks of corn.

transportation costs to the port, and ship loading facilities have been developed or improved following the development of the Seaway. With these developments, costs of exporting grain produced in Ohio, Indiana, Michigan and other states on the Great Lakes have been reduced. As a result, there are many times when grain produced near the Great Lakes can be sold in the export market at prices higher than those in domestic markets. This means that more buyers are competing for grain produced in these states, and its price is higher.

**TABLE 9—Seasonal Changes in Soybean Prices in Ohio
Based on F.O.B. Bids to Country Elevators in Central Ohio
for Immediate Delivery**

October Price	Monthly Price Change From October					5 Year Average \$2.07
	1957-58	1958-59	1959-60	1960-61	1961-62	
\$2.13	\$1.95	\$2.03	\$1.99	\$2.25		
Month	Increase in Cents per Bushel From October					
November	8	3	12	8	10	8
December	6	15	9	17	16	13
January	8	15	12	46	15	19
February	3	18	6	65	12	21
March	7	20	9	87	18	28
April	15	25	9	123	20	38
May	11	27	9	110	20	35
June	11	22	5	62	19	24
July	18	14	5	47	20	21
August	17	6	11	54	— 7	16
September	3	0	5	24	1	5

Monthly bids are those nearest the 15th for Number 1 soybeans. Prices quoted to farmers by local elevators are the above prices less the margin taken by the country elevator for its marketing services. The unusually large price increases in the 1960-61 marketing year greatly affected the 5 year average seasonal increase in soybean prices.

It is impossible, of course, to determine the actual increase in prices as a result of the Seaway. Many of the factors that influence prices have changed since its opening. Also, domestic and export prices vary from time to time and even day to day, depending upon domestic and foreign demand. In the absence of actual calculations, some authorities estimate that at times prices may be 8 to 10 cents per bushel higher within the truck-in area of Toledo. The price advantage declines with each increase in the cost of transporting grain to the Toledo port.

Distribution of the additional price of grain among exporters, country elevators and farmers is not very predictable nor very constant. The extent to which each of these groups shares in the additional price depends upon the relative supply and demand of each group. Also because of the Seaway, foreign importers may at times be able to buy grain at lower prices.

8. Do Government Programs Affect Grain Prices?

Yes. All farm programs affect farm prices. This is their primary purpose. Farm programs affect supply and demand. For example, acreage allotment price support programs attempt to reduce the supply by getting farmers to reduce their acreage (providing two-thirds of them vote for it). It affects the demand by essentially offering to buy farmers' grain at a stated annual price. Also, the government owns large stocks of some kinds of grains which it has bought in previous years. Under a set of permissive specifications, these stocks can be sold in both the domestic and foreign market. This fact may make government stocks of grain available and thereby increase the total saleable supply. This may have a very large impact on the price.

For example, in the marketing year 1961-62, corn production declined, but large quantities of corn that had been bought by the government in previous years were released upon the domestic market under the certificate pool plan. Total available supplies actually increased and so did total domestic sales. Total supplies on hand to be carried forward at the end of the 1961-62 marketing year declined about 18 per cent from the end of the preceding marketing year. Thus, the government policy in that year resulted in a decrease in corn production, an increase in sales of government owned corn, a depressed corn price that year, and some decrease in supplies to be carried forward to future years.

Part I includes a discussion of supply control, demand elasticity, and influences of large and small crops on prices. That discussion fully applies to grain crops. A decline in the total available supply of grain crops, except probably soybeans, will result in larger returns to the entire group of producers of these crops. It will also result in larger returns to individual farmers. However, a farmer knows that his individual production will have no noticeable effect on total supplies or prices. Therefore, if he alone reduces production, he merely reduces his income. In this situation, his production objective as an individual is in contradiction to his production objective as a member of the entire group of grain farmers. This conflict of objectives makes it very difficult for farmers even with government and private programs to control production.