FUNDAMENTAL PRICE BEHAVIOR CHARACTERISTICS IN COMMODITY FUTURES

by Roger W. Gray
Food Research Institute, Stanford University

FUTURES markets are an anomoly to those economists who study them least, an anchronism to those who study them a little more, and an annoyance to those who study them most. They are attacked for the wrong reasons and defended for the wrong reasons. They are attacked chiefly for facilitating increased price variability, which is often desirable; and defended chiefly for transferring risk, which is often unimportant. The fact that they might at the same time increase price fluctuations and transfer risk is just as well lost sight of, the resolution of a seeming contradiction being an exercise in sophistry when both of its terms are overemphasized. Meanwhile futures markets deserve to be cast in the competitive equilibrium model, with its market structure variants, and meanwhile also some fundamental and not so fundamental price behavior characteristics have been established inductively for futures markets without reference to orthodox theory, but with roundabout implications for it.

To cast them in the competitive equilibrium model, consider first the step-by-step evolution of a futures market in the light of the commonly stated requirements of competition. These requirements are usually given as:

(1) large numbers of buyers and sellers
(2) a homogeneous product
(3) free entry
(4) full information for all participants

Futures trading originally emerged, about a century ago in this organization, out of the trading in time contracts, or forward contracts, that already existed. Each new futures market that has since been established has evolved in much the same pattern as the first one; and it is worthwhile noting the particulars of such evolution. The time contracts then in existence were agreements between individual buyers and sellers, referring to specific lots of the commodity (corn or wheat), a price and a delivery period. Such contracts had existed for centuries, and are still common in and out of the commodity trade. You can buy a house or an automobile today on a contract for future delivery, or subscribe to a magazine or be fitted for a suit of clothes, and in most cases the seller is agreeing to deliver an article not yet in existence — he is a "short seller." These are not futures contracts.

The first step toward futures trading occurs when these time contracts change hands within the trade. A buyer who in November had purchased 5000 bushels of corn for May delivery, because of changed evaluation of price prospects or because of financial exigencies or whatever, might decide to find a new buyer for the corn; and having found one would instruct the seller to deliver to the new buyer. The next step is necessitated by the first; the exchange of the time contracts is facilitated by standardized descriptions, hence and standards come into being. Another step toward futures trading occurs when this first process has been carried far enough to suggest it; namely, substitute buyers, from outside the trade, may purchase these time contracts with the view in mind of reselling them prior to the delivery period. Obviously, the market

must have already developed sufficiently to assure these substitute buyers of the salability of their contracts. The most important step, and the most important distinguishing characteristic of futures trading, is the establishment of a clearing house. This relates back to each of the earlier steps. When the time contracts first changed hands, the first buyer was acting as his own clearing agent, in transferring his obligation to receive corn to another buyer. But this was an imperfect clearing procedure, in that legal recourse could always be had against the original buyer. The creation of a clearing house enables full legal offset of a contract, by the device of making the clearing house itself responsible for one side of all contracts. Thus no contracting party has an obligation to another contracting party, and this greatly facilitates the entry of substitute buyers. A fully standardized contract is also necessitated in order that all obligations to the clearing house be commensurable, thus enabling perfect offset. In addition to facilitating the types of transactions already underway, the clearing house opened the way to substitute selling as well as substitute buying.

The transition from ordinary dealing in time contracts to futures trading may now be viewed against the requirements of perfect competition. The large numbers requirement is more closely approximated in futures trading in two ways, one of which has not been mentioned. This is the rule that all trade in futures contracts must occur in one trading ring — thus the number trading in a given market is maximized, preventing the fragmentation of a competitive market into a number of separate monopolistic markets. Secondly, numbers are actually augmented by the addition of the aformentioned substitute buyers and sellers, commonly called speculators.

The requirement of product homogeneity is more closely

approached in futures trading by rigid contract specifications. The needs of the various users of futures may differ over a fairly wide range of grade and quality characteristics, but they are pricing an identical product when they buy and sell futures — the contract grade.

Entry is facilitated by the integrity of the clearing house, which in turn makes it possible to buy and sell on very small margins, such that capital requirements are a lower barrier to entry in these markets than into any other business wherein comparable volumes are contemplated.

Full information of all market participants may have one of two meanings, both of which are better served in futures trading. It may mean full immediate disclosure of all actual transactions, which is of course a requirement in futures trading. Or it may refer to publication of a wide range of information having bearing upon potential buying and selling, which futures markets as well as member firms also perform. Information compiled and published by the Chicago Board of Trade has virtually the same status as official information.

If economists have correctly perceived the requirements of competition, as I think they have, then clearly the emergence of a futures market enhances competition. Indeed, it is doubtful if any other market organization *can* approach a futures market in competitiveness, owing to the impossibility of achieving certain of the requirements in such a high degree. And in fact futures markets exceed the basic competitive standards in some respects. Clearly the impersonality of the marketplace is one of the features economists have intended to describe in stating the requirements, yet futures markets require impersonality as a matter of organization and regulation. All contracts are with the clearing house, all trades must be by open outcry in the same pit, where no private treaties are permitted, and, finally, most traders do not know which prin-

cipal they may be trading with, as the actual trade is with a broker who represents several principals. Further, no market but a futures market can bring in substitute sellers on exactly the same terms as substitute buyers, whereas the requirements of competition do not contemplate substitute buying and selling, being geared to the notion of a "spot" or "actuals" market.

The foregoing may suggest an often overlooked consideration: that it is more than the *industrial* organization which dictates the degree of competitiveness in price determination; the organization of the price finding process itself, given the industrial organization, is an important determinant of the existence of competition. The industrial organization must be amenable to competitive price making, as the necessary condition, but that it is not sufficient to assure it. The establishment of futures trading helps to assure it, and the fullest expression of competition occurs when the futures market is routinely used and regarded as the locus of price determination by all or most of those having occasion to buy and sell the commodity.

Since futures markets so closely approximate the requirements of competition, it may seem surprising that futures prices have not been more studied as models of competitive price behavior. A tendency to underemphasize the price making function and overemphasize the insurance function of these markets may partially account for the seeming neglect; but more important, I believe, is the fact that price behavior as such has not been a particularly fruitful line of empirical investigation in economics, excepting insofar as various administered prices have been shown to reflect non-competitive practices. The National Resources Committee investigation of price behavior was perhaps the most ambitious empirical study to test the implications of theories of imperfect compe-

tition, but the direct findings were limited to depression and recovery sensitivity, as distinct from sensitivity to continuing change in a full employment growth economy. Prices that are determined under such obviously competitive conditions as commodity futures prices have not been studied nearly so much as prices determined under the various aberrant conditions. Nevertheless, futures prices have been studied sufficiently to permit some tentative generalizations, including as perhaps the most important one that not all futures prices behave similarly, as even at this level of refinement there are important differences in the degree to which the various markets approach the ideal.

The first important investigations of futures price behavior dealt with futures price *spreads,* or spreads between spot and futures prices. In his "The Theory of Price Storage"[1] and "Theory of The Increase Carrying Charge In Futures Markets"[2] Working, established the very important empirical generalization that wheat price spreads were highly correlated with stocks, describing a functional relationship that required interpretation as a storage supply curve. This interpretation was required because the alternative interpretation of price spreads — that they reflect market judgment of development likely to occur between successive delivery months — could not be supported by the evidence. I view this as the single most important contribution toward an understanding of futures markets, not because of its intrinsic importance, which may be less than that of some other aspects of price behavior, but because it refutes a fallacy which is very easily and logically embraced. Yet even this can scarcely be called an empirical generalization from futures price behavior — it is only a generalization from *wheat* futures price behavior. It is probably

[1] Working, Holbrook *Am. Econ. Rev.,* December 1949.
[2] ....., *Journ. of Farm Econ.,* February 1948.

valid for other markets which deal in a commodity, substantial stocks of which are carried over from one crop year to another. It is certainly not valid for potato futures, since there is no year-end carryover of late potatoes; nor is it valid for coffee futures, since that market attracts insufficient speculation to provide accurate estimates of the price of storage. Hedging which is oriented toward appraisals of the price of storage can thus be routinely accommodated in wheat futures, whereas hedging in coffee futures requires a different approach, which tends to perpetuate the different price behavior pattern.

If an important function of price is to allocate existing supplies between present consumption and storage for later use, then the price spreads in wheat futures approach the ideal in this respect, as price spreads in coffee and potato futures fail to do for different reasons. Since the futures markets are similarly organized and regulated, one might be tempted to infer that the wheat market is more competitive, or that it operates in a different market structure, enabling its price behavior to reflect the current stocks level with great precision. This seems to me a very dubious interpretation, however, and I lean toward a different one which carries one of the roundabout implications for market structure theory of which I spoke earlier. My impression is that the potato and coffee markets meet the requirements of competition, in the structural sense, as well as or better than the wheat market, at least at the relevant level, and that the organized markets are just as conducive to competition as the wheat market.

The number of firms that are responsive to wheat price spreads in their search for profits is relatively small, and the size concentration is great. It consists essentially of a few grain merchandising firms and a few flour mills, each of which strives to achieve the economies associated with very large volume

on small unit margins. These firms are very much price oriented, and with the aid of speculation the markets on which they do their pricing guides wheat into and out of storage with remarkable precision.

The potato market, with little or no concentrated commercial storage, produces a seemingly perverse set of price spreads. Instead of producing relatively high carrying charges in times of current surplus, and lower or negative carrying charges in times of current shortage, the potato futures market tends to do the opposite. High November prices are associated with high carrying charges to May; lower November prices with lower carrying charges to May. Why is this so? It appears to me to be partly explainable in terms of the lack of commercialization and concentration of storage. If potatoes were stored commercially by large firms seeking to profit from price spreads, as with wheat, the price spreads might widen when surpluses existed and narrow with shortages. But as it is, with storage unresponsive to spreads because it is dispersed throughout the growing area, an opposite pattern prevails. A related reason for this I presume to rest in the fact that potatoes are not carried over from one crop year to the next, hence the market cannot reflect "current" shortage, which is a relative term, but only absolute shortage. In any event, the price behavior in potato futures does not reflect the same use pattern as in wheat futures; and this is the critical factor. "Competition" can exist in different settings or toward different ends, producing different price behavior. The underlying market structure may offer a misleading guide to its extent or intensity, while the resultant price patterns may vary significantly between two equally "competitive" markets.

In other terms, which seem to beg the question of competitiveness, the potato market may be said to have excess hedging capacity. Speculation forces up the prices of distant futures

during periods of shortage to an extent that hedgers do not take full advantage of — to refer to this as too much competition among speculators or too little competition among hedgers is to sweep the real question under the rug. The real question is how responsive would buyers and sellers be to a temporal price pattern in the absence of a futures market if they are somewhat unresponsive in its presence. I can only assume less responsiveness, at the same time that I assume that buyers and sellers of wheat would still produce something like the wheat price patterns in the absence of a futures market.

The conclusion I draw from this simple contrast is as follows: I think that wheat price spreads behave more nearly in accordance with the ideal *because* the market structure approaches the competitive model *less* closely. The fact that wheat is assembled and processed by large firms, which can profit from low unit margins, as potatoes are not, permits a degree of precision in price response which is unattainable for potatoes, given the physical characteristics and uses of the two commodities. At the same time, the contribution of the potato futures market may be greater in the sense that it effects a greater difference over what would otherwise be, even in regard to price spreads, but more particularly in regard to price characteristics upon which the users focus.

Coffee price spreads contrast with wheat price spreads in a different way and for a different reason. The Brazilian government . . .

> "has chosen to carry coffee stocks at its own expense. This presumably would have resulted in a market price of storage averaging about zero if the coffee futures market could have remained a balanced one. But because speculators tend, wisely, to avoid a market where the price is subject to arbitrary change by any group (or government) that holds dominant influence, the coffee market was left with little ability to carry the load of risk that some private holders of coffee stock wished to shift to it. Consequently the price of hedged storage

of coffee has been persistently negative."[3]

To summarize my views on the behavior of price spreads, as inadequately illustrated from three futures markets; some price spreads, as for wheat, closely approximate the competitive ideal, whereas others depart rather widely from the ideal for different reasons — and a rigorous structuralist approach to the markets affords little or no clue into the causes of this divergent behavior. So much for futures markets and the temporal allocation of stocks, about which much more might be said if time permitted.

Little need be said about futures markets and the geographical allocation of stocks, where in general, similar considerations apply. Where hedging firms in widely dispersed locations gear their purchases and sales to the futures market, it affords a reliable guide to geographical distribution of supplies. A special situation occurs when there is more than one futures market for the same commodity, again illustrated by wheat, and arbitrage among futures markets lends extra refinement to the process. This is demonstrated in my article — "The Relationship Among Three Futures Markets."

Bias in Futures Prices

Another characteristic of futures prices for which substantial evidence now exists has been studied because of its relevancy to the theory of futures trading. The late Lord Keynes, in one of his inimitable little essays, described in the *Manchester Guardian* in 1923 one of the basic functions of the futures markets as well as it has ever been expressed. This is their function of providing enormous quantities of short term credit for financing commodity stocks, which Keynes described accurately and vividly, with characteristic insight and flourish.

[3] Gray, Roger W. "The Characteristic Bias in Some Thin Futures Markets" Food Research Institute Studies, Vol. I, No. 3, November 1960.

From this point he proceeded to some horseback estimates of the cost of this credit, in the form of a risk premium paid to speculators, which suggested a pronounced bias, of the order of at least 10 per cent annually. Whether Keynes confused inverse carrying charges with what he called "normal backwardation" is not clear, but it is amply clear by now from study of the leading American markets, to which he referred, that he grossly overestimated any general tendency toward downward biased estimates of prices on futures markets. In fact, the weight of the evidence now available does not support a risk premium theory at all. The published sources on this point include two of my articles, as well as work by Telser, Houthakker, and Cootner cited therein. But the most conclusive evidence yet assembled is contained in an unpublished Ph.D. dissertation by Charles Rockwell, on file at the University of California. Rockwell shows, in a study that will be published in the near future, that the net return to the long open interest in the 25 regulated markets in the United States, over a sixteen year period, was approximately zero.

In addition to this refutation of the theory of normal backwardation, and indirect support for the Holbrook Working interpretation of hedging,[4] Rockwell's results seem to me to provide very good support for my own theory that the thin markets produce biased price estimates, upward or downward, while the better used markets produce unbiased price estimates.

As with the relation between price spread behavior and stocks, generalization must be limited to the highly developed markets, related to the use pattern, and qualified according to external influences such as government support programs. With such circumscription, however, it is a well-established

[4] Working, Holbrook "Hedging Reconsidered," *Journ. of Farm Econ.*, Vol. XXXV. No. 4, November 1953.

generalization that futures markets produce unbiased price estimates.

Here again it is somewhat curious that the futures markets have not been cast into the competitive equilibrium model, as a close approximation to the theoretical no-profit equilibrium, given the competitive conditions. But economists have tended to explain them either in terms of risk-transfer or as games of chance, instead of viewing them as true markets. Price determination as such is curiously treated as a free gift of nature in the competitive model, instead of the economic activity which it really is.

Futures Prices as a Random Walk

If we ask what would be the single outstanding statistical characteristic of price behavior in an ideal market, the answer must be that price changes would occur randomly, so that the time series describes a random walk. This follows from the assumption of randomness in the occurrence of events which influence prices, abstracting from secular trends and from seasonal patterns (which futures markets conveniently eliminate anyway). Unfortunately, the simplicity of the concept does not assure simplicity of measurement — non-randomness of various sorts being identifiable but randomness being intractable to measurement. The "perfect" market would not give rise to price reactions, biased estimates, or any of the various formations so dear to the hearts, if not the pocketbooks, of chartists. Neither the "penumbra" envisioned by Taussig nor the Brownian motion envisioned by some modern statisticians would be discernible.

If one makes due allowance for the temporal dispersion of the price effects of new information, as Larson[5] has done with an adaptation of a statistic designed by Working, daily corn

[5] Larson, Arnold B. "Measurement of a Random Process in Future Prices" *Food Research Institute Studies,* Vol. I, No. 3, November 1960.

futures prices on the Chicago Board of Trade describe a very close fit to a simulated random walk for two ten-year periods.

I am particularly hesitant to generalize these results to other markets, at the same time that I accept them as an important empirical finding. Differences among futures markets are wide enough, without ever contemplating the wide gulf between futures markets and the myriad of marketing arrangements which are less coducive to competition. If it becomes possible, as I anticipate that it may, to catalogue patterns of price behavior among futures markets fairly exhaustively, and explain the difference, with the better used markets standing at the apex of competitive performance, considerable insight can then be obtained into price behavior on other markets. The comparative barrenness of the market structure approach to an understanding of competitive behavior and performance underlines the need to pursue these alternative analyses of price behavior.

Since I am proceeding more or less in the order of the importance and empirical validity of certain characteristics of futures prices, and have next to turn to some less important, less well verified, or less easily explainable characteristics, it is perhaps opportune to comment upon the relationship among the three already described, framing the comment in terms of the commodities earlier chosen for illustrative purposes. The noteworthy feature is that the better used market performs better in all respects. Not only has the wheat market evoked price spreads which reflect the stocks level accurately, in contrast to the potato and coffee futures markets, but it has displayed no discernible price bias, whereas the potato and coffee markets display pronounced bias in opposite directions — coffee futures prices having been consistent underestimates and potato futures prices consistent overestimates of subsequent price levels. It follows of course that the latter

two markets do not leave the tracks of a random walk, whereas I surmise from collateral evidence, without having measured it, that wheat futures prices of the interwar period must have approached the ideal in this respect also. I doubt whether any market has ever reflected supply and demand so accurately as the market for nearby wheat futures between 1920 and 1940.

Other Price Behavior Characteristics

The term "futures" is rather unfortunate in its connotation that a future price level is being predicted. A futures price is better regarded as the present price of an article for future delivery, thereby emphasizing the function of reflecting known and knowable factors in present prices, rather than peering into the unknown. Viewed in this light, price levels which are seen in retrospect not to have been warranted by subsequent events do not constitute "mistakes," nor evidence that speculation causes unnecessary price fluctuations.

The theoretical argument over this point has been a sterile exercise, yet it cannot quite be called a meaningless question. A smattering of evidence from futures price behavior may help to clarify, if not to resolve, the question. Consider an intriguing little contrast between corn and wheat futures prices at Chicago during the interwar period. Both of these markets produced unbiased price estimates, both produced spreads highly correlated with stocks levels, and both probably produced something like a random walk. Yet while no general bias in price *level* was observable on either market, corn futures prices reflected overestimates of price *change,* and wheat futures prices reflected underestimates of price *change.* In other words, when the future in its delivery month was above the next future, the next one tended to rise for corn and decline for wheat; and vice versa when the expiring future was below the nearby. Now you might argue that there was overspeculation in corn futures and underspeculation in wheat

futures — that a little more speculation would have widened the wheat spreads and a little less would have narrowed the corn spreads, both toward levels that were subsequently vindicated. The trouble with this interpretation is that it is hedging firms who characteristically sell the premium futures and buy the discounted futures, which might tend to suggest overspeculation in wheat and underspeculation in corn. The real logical dilemma is caused by the fact that, given the futures markets, underestimates of price change can be caused by too much selling or too little buying, such that overspeculation always has its counterpart in underspeculation. Yet without these futures markets the price estimates would almost certainly have been far more erratic.

A further point on the interpretation of excessive speculation may be derived from consideration of some of the biased markets. The potato futures market has evoked rather chronic overestimates of price level. While it may be said that speculation occurs in excess of the hedging use; it seems in some ways more meaningful to say that there is excess hedging capacity in the market, particularly in view of the fact that only a minor fraction of the stocks are hedged. There is a tendency to think that "legitimate dealers" establish the right price, which speculators might distort — but why not think that speculation establishes a right price, which legitimate dealers may sometime distort, through errors of omission or commission?

The egg futures market has also evoked chronic overestimates of price level, in somewhat different circumstances. Hedging use has been declining rapidly in this market, while it rose rapidly in the potato market. Purchase of egg futures does seem excessive in these circumstances, but it is also interesting to note that the large speculators have increasingly moved to the short side to defend lower prices. Speculation

which is no longer required to carry the hedging load will probably soon die out — indeed apparently has pretty well dried up already — but meanwhile it can still do a creditable job of price estimation.

Other attributes of futures prices for which there are morsels of evidence refer to influence upon the seasonal range in spot prices, and the influence upon cobweb type cycles. Theoretically, a futures market should reduce both of these phenomena. The opportunity to compare futures and non-futures situations, with other things held constant, is not provided, however. A close approximation to a controlled experiment was provided when Congress outlawed onion futures dealings. It seems clear that the onion futures market did reduce the seasonal range in spot onion prices, particularly by anticipating and ameliorating late season adjustments.[6] The potato futures market appears also to have reduced the year-to-year fluctuations in Maine potato prices, by providing a reliable guide to plantings, although this effect has not been dramatic because of limited reference to the futures market.[7] The auspicious beginnings of trading in frozen pork bellies, cattle, and beef afford the hope that the cobweb type cycles in these products may also be ameliorated.

My final comment has to do with aberrations from ideal price behavior, which occur frequently and for a variety of reasons. Markets make mistakes, either through insufficiency of information or erroneous interpretations of information. Prices are occasionally manipulated on futures markets, even though it is probably more difficult to manipulate futures prices than any others — the attempt being easier to spot and to defeat through natural market forces, not to mention the

[6] See Working, Holbrook "Price Effects of Futures Trading," *Food Research Institute Studies,* Vol. I, No. 1, February 1960 and Roger W. Gray, "Onions Revisited," *Journ. of Farm Econ.,* Vol. XLV, No. 2, May 1963.

[7] See Gray, Roger W. "The Attack Upon Potato Futures Trading in the United States," *Food Research Institute Studies,* Vol. IV, No. 2, 1964.

watchful efforts of the business conduct committee and of the Commodity Exchange Authority.

Prices are often constrained into aberrant patterns by outside forces, governmental or private. For instance, wheat futures prices have displayed a seasonal bias attributable to the workings of the government loan program.[8] It is sometimes impossible for prices to reflect, or to bring about, an ideal pattern of resources allocation when there are institutional rigidities in the system which do not respond to price. When soybeans are priced higher than the products, for example, is this poor *price* behavior? Or is it instead an accurate reflection, in price, of underlying distortions that are not responsive to price — for instance the extent and location of crushing capacity in the world, freight rate structures, etc., may dictate that some crushing capacity needs to lie idle for awhile.

In summary we do have some evidence of futures price behavior and we do know how to interpret some of it. It would be desirable to have much more, not just to attack or defend futures markets, but for the insight such evidence affords into the working of segments of the economy, and into the price behavior observable in situations where futures markets are not feasible. It should not be surprising to economists that at least some futures prices approach ideal behavior, perhaps more closely than any other prices, for after all these markets are designed to fit the competitive requirements better than other markets.

FUNDAMENTAL PRICE BEHAVIOR CHARACTERISTICS IN COMMODITY FUTURES

DISCUSSION

CHAIRMAN MUTTI: Well, gentlemen, you have been exposed to and have been given insight into the market and some ideas that I am sure we were only partially aware of be-

[8] Gray, Roger W. "The Seasonal Pattern of Wheat Futures Prices under The Loan Program," *Food Research Institute Studies,* Vol. III, No. 1, February 1962.

fore. We have the authorities here, so I think it's up to us to use them. Roger, will you comment a little more on your point about the ease of capital entry into the futures market?

This is utterly as an investment medium, I take it? Would you comment a little more about this aspect?

GRAY: It is essentially lower margin requirements which are justifiable on the grounds that the sole purpose of margin requirements in commodity futures is to protect the clearing house.

There was a bit of confusion after the vegetable oil scandal, between stock margin requirements and futures margins requirements. They are not intended to serve any purpose as the stock margin requirements are. In stocks, rules are established by the Board of Governors for credit, and if you want some reasons for having higher margins for stock, there are sufficient reasons, if you look at the daily index over the past twenty years. You will find that the price earnings ratio has ranged from about 6 to 1 to more than 50 to 1.

This can happen in commodities; it can be distorted for a short period of time, but it has to come back to the true asset value of the commodity twelve times a year, in the case of certain products, so you don't have that consideration.

You also don't have the consideration that new flows of investment capital in the stock market are necessarily inflationary. Because of the provision I mentioned earlier in this paper, you have essentially a symmetrical access to commodity futures prices on the buying and selling side.

You don't have that on the stock market. You have clumsy devices for selling short, but they are expensive and they don't work as well. For this reason, you don't have the credit control situation at all.

I wandered from your question into the defense of very low margins. The answer is that you have free or relatively free

entry because of the very low margin, so for 5 percent of the value of wheat you can own the right to price change in the wheat.

You don't own the right to the use or the enjoyment of the commodity during that period, so you don't own the wheat outright on a wheat futures contract, and you have not made a down payment on the purchase of an asset as you have when you buy a stock certificate, so you have something like 5 to 10 percent margin.

It is also true, speaking of free entry, that you have lower commission rates for the purchase and sale of futures contracts than anything I can think of, something like 1/10, in the Chicago Board of Trade, 1/10 of the rate that you have to pay for stock purchases; 1/100 of the rate that you have to pay for buying homes in the Chicago area.

This makes it easier to enter the business. You can enter it right tomorrow morning. There are two or three brokers in the room who may wish to comment.

NORTH: Do you have any evidence on relationships of flows of investment capital into the commodity market and the price variants?

GRAY: Oh, I guess I would be willing to say a couple of things about that without saying that I know of measurements. I don't know of quantitative efforts on this point, but it does seem clear that one of the reasons that the proportion of speculation in potatoes and egg and soybean futures and sugar futures a while back was very high relative to the proportion of hedging was the prospect of price change.

You simply have a much higher prospect of price change there, so a lot of this venture capital is really venturesome and as it goes into commodities, it wants commodities that can move.

I don't know of any quantitative evidence excepting of the

kind of thing that we could see — I could and will give you an area tomorrow that suggests a little bit of something of proportions of speculation in the various markets, and I am sure this correlates with prospective price change, but I think it correlates with some other important factors, too.

Rice and oats have always been more speculative than corn and wheat relative to the total volume of trading, and even during periods when you didn't have this loan program, and I think that was for reasons other than the prospective price variability; I don't think there is any inherently greater prospective price change in oats than there is in corn.

GOLDBERG: In one of your many papers, you made an analysis, if I recall, of the impact of wheat future hedging operations under the loan program and not under the loan program.

Could you tie that paper in with your structural analysis? You said that the structural analysis itself might be unimportant, sometimes, to the analysis of the futures market, but nevertheless, an important structural variant would certainly be the presence of a government price-support program.

GRAY: Yes, I think you define structure more broadly here. I referred at one point to a more rigorous, stronger interpretation. I prefer your concept of structure, but I wasn't talking about it there.

It is certainly true that the market structure is altered in a very important sense. The institutional framework is altered if you have a loan program, and it certainly influences the price pattern. And if you want to make competition mean everything, then you can always explain everything in those terms, but what I was really poking at a little bit was much more rigorous structural interpretation which, in fact, you have attacked.

EHRICH: You were talking about personality in the struc-

tural aspects of markets. I would like to have you define exactly what you mean by personality, because I get the idea from looking at the trading going on, there is a lot of personality at work in making trades, and maybe you can even call it personality cults; the thousands of people that do the actual trading and know each other from day to day, what is the difference between this and the personality you were hinting at?

GRAY: Well, I said that it seems to me that economists were striving to define a situation in which a market could be as completely de-personalized or impersonalized as possible, just to avoid price negotiations. Price negotiations always tend to let personality into the ultimate contract more than otherwise.

Each time I go into a shoe store, I end up buying a higher-priced shoe than I intended to, because this guy's personality grates on me to such an extent that I want out of there.

Or you go into your Cadillac showrooms, as I am sure you do, and you get taken into one of these plush little side offices, and the first thing you know, the top price that you were going to pay for that Cadillac when you walked in there has been lifted a little bit by this fine treatment you are getting.

And all I am arguing is that the markets perform best if they are de-personalized in this sense, and the markets do de-personalize.

Granted that there are a bunch of characters in the pit, but they don't care about each other's personalities, or personal habits, and they have no opportunity to make private trades with one another, and there is no negotiation except for open negotiation.

EHRICH: I think you can dispute the fact that they don't care about it. In other words, there may be a guy that is very successful in trading; has been on the Board of Trade for

years and years, and an important piece of news came up the night before, and others watch this guy very closely. Is this competitive?

GRAY: I would say that I am forty-four years old today —

EHRICH: Congratulations.

GRAY: —and I don't believe in perfection any more. But I am talking about some approach to this idea and I am saying simply it is a narrower approach than you view in other markets.

EHRICH: In other words, we will say in Wyoming we have a lot of direct buying of cattle, and so we have this personality problem. We have this sharp character from Denver. He has operated in the market for years.

He goes up to the cattle man who only gets in the market once a year and his personality plays a big factor in the price.

GRAY: That's one kind of personality.

EHRICH: The other, perhaps, is this pit trading, which is a kind of a club. I don't mean to say there is anything wrong with it or put my finger on it, or make a claim, but it is possible that there is a different kind of personality that is even more important or influences prices more than a personality out in the country in Wyoming. I don't know.

GRAY: Since price, of course, is the only variable down here in the pit, then if anything gets influenced it is going to be price, by any of these personalities. To that extent, you are quite right.

By and large, I don't make much of it. Of course, it exists. And I overstate to a certain extent when I say that these brokers are representing several principals and you wave your hand at this guy and you don't know whom he is trading for. Well, sometimes you do or you have a pretty good idea, but this is because it is a human institution, really.

ANDERSON: In your discussion of potato markets, you

make a distinction between what you call an excessive hedging capacity and an excessive speculation. I wonder if you could amplify a little bit on what this distinction really is.

GRAY: Well, Don, I didn't really mean to make the distinction too seriously, because I believe if we looked at my phrase, I said: "Shall we call this excessive speculation or excessive hedging capacity," and it seems to me that trying to label it either way sweeps the real question under the rug.

It is undoubtedly true that there is excess hedging capacity. If commercial people want to sell more potato futures, they have had the opportunity to do so to make money, and they haven't fully taken advantage of the opportunity, and that's all.

It seems to me that to refer to this as excessive speculation doesn't get us anywhere.

Now, on egg futures it is a little bit different, I think. One of the reasons I say I don't want to call it excessive speculation of potato futures is that the hedging operation of that market has been growing by leaps and bounds. In the egg futures, where it has been declining and you've got the same price characteristics, I think it would be desirable if this speculative factor would go elsewhere.

Well, fortunately it has gone from eggs to bacon, and some of it is working on the bacon market, and that's good.

BAKKEN: Would you suggest there is a paucity of capital on futures markets?

GRAY: I don't think there is. I think that speculators have responded with great alacrity, and they have been willing to lose money quite consistently down through the years.

I am not talking about the professionals here. I do think that they show a certain degree of discernment in refusing to get into a game with loaded dice, and we will talk a little bit about a couple of cases where the dice have been loaded

around here. But I don't think there is a paucity of capital. I think there is speculation on commodity futures. In general, I think there has been an overwillingness to speculate. If you look at the speculation for over half a century they have lost money.

ANDERSON: I would like to pursue this one step further. Do you have any real inkling as to why potato traders — I mean storers, now, of potatoes, have been reluctant to use the futures market? There seems to be a gain for them in so doing.

GRAY: We are at another one of these impasses, Don, where I am not even sure reluctant is the word. Where it is growing by leaps and bounds, are we going to say that 75 percent is reluctant? I don't know how fast the market can grow.

But to the extent that maybe you would expect all of them to come swarming in, and they haven't, I suppose that they are reluctant. This may be attributable partly to ignorance, partly to prejudice, partly to a stubbornness on the part of some of these New England farmers who want to burn any pit we have.

GOLDBERG: You mentioned that manipulation in the futures market is out in the open and therefore it is better than behind doors.

BAKKEN: Since when?

GOLDBERG: Well, really, he said that it can be defended.

GRAY: It is easier to detect, I should say.

GOLDBERG: Easier to detect and overcome?

GRAY: Yes.

GOLDBERG: On the other hand, though, if a person successfully uses the futures market in his own operations, and makes a fair profit, what is to prevent a competitor from saying that that fair profit or his successful utilization of it in his

own operations wasn't an attempt to manipulate? How do you answer that?

I am sure that the futures markets have been open to this charge many, many times.

GRAY: Sure. Well, the economic answer would be to ascertain as best you can what the price determining factor is at the time indicated, and see whether the price was abnormally high or low. That's all the economist can say about it.

The economist can't talk about intent; that has to be solved in the courts. The real remarkable thing to me is that in our business conduct committees or in the Commodity Exchange Authority, we have had so few such allegations; so few.

There is enough respect, I think, for the institution as such that this deters people who are otherwise some of the nastiest people in the world from blowing the whistle on one another. I think that the institution itself has a very salutary effect on the behavior of people.

Now, it still happens every now and then, that somebody says the contract is crooked or somebody manipulated, but by and large, there is very little of this kind of allegation that you speak of.

ULLMAN: I heard several times this afternoon that it is the amateur, so to speak, who loses his money in the futures market. I don't deny it. I don't have any reason to.

But how do you define who is losing and who isn't? They don't tell you. How do you know if it's part of a hedge, in which case you can't tell.

GRAY: Well, it isn't something that has been measured with precision. There are two classes of evidence you can have on this.

The better, larger class of evidence is from this same study by Rockwell that I referred to. You can measure with a fair degree of precision if you take a long enough period of time

on the profits and losses to the various reporting categories of trade to the CEA, and then you make the fairly large assumption that most of the rather amateur speculators are in the small-trader category, which is not quite to make the reverse assumption.

I don't say that the small-trader category in all the commodities will be amateur speculators. It will be the other way around, and this category loses money in just about all the commodities, fairly regularly.

Now, the other kind of evidence which is more pinpointed but also, you can make less of it, is a study by Blair Stewart in which he had access to all the books of a commission firm, and studied the results of people trading. The small speculators lost their shirts over a nine-year period, but that may have a little bit of bias in it, because the commission firm went into bankruptcy.

ULLMAN: I don't want to pursue this too much further, but the point that I am making is that a futures contract or a futures purchase and sale can have a cash or a spot position outside of the exchange, and not a part of the exchange, and so it is almost impossible to pinpoint in any specific case.

GRAY: That's right. You are quite right. I agree with that.

Now, this, of course, would not be characteristically true of small speculators. They don't have this.

CHAIRMAN MUTTI: Professor Heifner has a question.

HEIFNER: This is related to the preceding question. I wonder if you would comment on the role that these small speculators play in price formation? It is desirable, good, bad, or virtually no effect?

GRAY: Well, I will put it sort of in this order. I think that the dominant price-making influence on the better futures markets is from the hedging firms.

The second most important price-making influence is from the local large speculators, and thirdly, the little traders who trade through commission firms.

One thing Stewart's study showed was that the small speculators lost because of bad trading technique. They held losing positions too long and sold out winners too quickly. Commission firms have information and have good research departments. They are not different, really, from commercial firms and the large speculators in this regard. I think the small trader falls down in the trading manifestation of that information, and hence, I suppose that he has the least salutary effect of any major group of traders on price determination in the market.

I would say at the same time that it is a very important contribution from the standpoint of liquidity of the market, and I think it is a very important contribution to have people willing to lose money regularly. I think this helps the commodity economy.

MUTTI: Like a distribution of wealth.

GRAY: Yes, it is a transfer payment from the Des Moines piano teacher to the farmer in Iowa.

HANSEN: Pursuing this a little bit further, could it be a question of definition: If the guy loses, he is a little guy; if he wins, he is a big guy?

GRAY: Exactly. Of course, of course. You look at the categories — CEA reported categories — and you know people are moving into and out of those categories. If you move into the category, you are a little guy, and if you move out of the category, you are a big guy.

ARTHUR: Did you get any new line on the pinpoint observation of the outcome of individual speculation history from this study of Seymour Smith recently, which you referred to? This would be newer than Blair Stewart's, I suppose.

GRAY: I have read parts of Seymour Smith's study. In fact, I read it in manuscript stage, and we are publishing a part of his study, but I have not read the part on speculation behavior patterns, so if there are any new ideas from that, I have not read it.

There are some interesting analyses of price behavior that I could name that I have read. I have read the section on patterns of trading or behavior of speculators, so I can't comment except to say that Seymour Smith has done some good work.

EHRICH: Roger, on your statement on the concentration on storage and how it was related to price trends, could you expand a little?

GRAY: The more important word I think is commercialization, but I think it will be more commercialized when it is more concentrated. In wheat the essential function of a large grain merchandising firm, a Continental or a Cargill, is to ascertain as well as possible the proper price of storage. That is their business.

There are no people doing that in potatoes. There are people who store potatoes and store them routinely. People who don't store potatoes don't gear their storage decision to a price of storage and if you don't gear your storage decision to a price of storage in the marketplace, then the marketplace won't reflect the price of storage.

EHRICH: Well, the dispersion seems to be very little —

GRAY: Excepting insofar as I think there is that much less likelihood that it will be commercialized if it is dispersed. I think the storage space is there, and they are going to use it, and they have made this decision partly in terms of price prospects. In any event, it is perfectly clear that the amount of bushels stored has not responded to the storage charge, and hence it is not even proper to refer to that as a carrying

charge in potato futures. It's got to have some other label.

EHRICH: Couldn't two billion potato farmers decide to look at today's price and say, "I've got an extra basement. Let's store it ourselves"?

GRAY: They could. I think the greater likelihood occurs with concentration, however, because the very big operators are the ones who are most responsive to very small margins. This gets to be a big volume deal, where a penny may be the difference. I think you will never get to that situation where a penny a bushel will make that much difference to a corn farmer as to whether he stores or not, but it does to Continental.