Speculation and Price Behavior on Commodity Markets: A Survey

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*K.H. Kahl, A.B. Paul, and K.L. Robinson provided helpful comments.
"... The chief distinction between futures markets and alternative forms of commodity marketing lies in the greater degree of competition in futures...." Gray and Rutledge, p. 57.

This is perhaps a correct generalization—futures markets are often characterized by many buyers and sellers, each with little influence on price. In this context, speculation seems likely to be beneficial, providing liquidity and assisting in necessary price adjustments. But it is market imperfections that attract attention. Members of the futures industry stress the competitive nature of commodity markets, while, not surprisingly, the general public and their representatives in the Congress are more interested in the imperfections.

The literature on the price effects of speculation on commodity markets is surveyed here in a structure-conduct-performance framework.\(^1\) Although the framework is not new, I think it is a useful and somewhat uncommon way of examining futures markets. Both competitive and noncompetitive behavior is of interest.

Structure of futures markets

Both the theoretical and empirical literature imply that structural characteristics of futures markets influence conduct and performance. Structural characteristics identified by various authors include the number and concentration of traders, the type and adequacy of traders (e.g., scalpers, spreaders, and position traders), the number or proportion of informed traders, contract provisions, and institutional features such as number of exchanges and items traded. If a competitive market prevails, no single trader has a perceptible impact on price; traders are sufficiently well informed to keep prices at warranted levels and price differences in appropriate alignment. Contract specifications are important since they influence the volume of trading throughout the life of the contract and influence delivery costs. Further, the existence of other markets and/or contracts may provide beneficial complementaries and alternatives to potential traders; the soybean meal, soybean oil, and soybean contracts provide for hedging of margins; the wheat contract presumably benefits from the existence of different markets for different types of wheat; grain exporters may benefit from the existence of currency and interest rate futures as well as grain futures.

But markets may have an imperfectly competitive structure. A market may be dominated by a few large traders, and these traders may benefit significantly from insider information (say, as alleged by Morgan). The volume of trading may be small. Contract provisions may discourage market use, and so on. An objective of research presumably is to identify structural elements that lead to poor performance.

Holbrook Working (most recently in 1967) has provided a useful classification of speculators and discussed their roles in price formation. In large, well-developed markets, individual speculators tend to specialize. Some tend to hold positions for a few seconds or minutes, others for a day or more, and still others

\(^1\) Gray and Rutledge provide an extensive review of the futures market literature, and Leuthold and Tomek have recently surveyed publications on livestock futures. The references contained here are intended to illustrate the range of topics covered in the professional literature closely associated with futures markets. For general discussion of the price effects of speculation, see Farrell, Friedman (p. 175), Kaldor, Kohn, and Schimmeler.
for weeks or months. Scalpers and day traders provide the liquidity which
minimizes the effects of large, periodic hedges. The amount of speculation,
Working argues, is closely dependent on the amount of hedging. In some
markets, however, speculation appears to be inadequate or only marginally
adequate relative to the volume of hedging. Hence, an attempt to place a large
hedge could have a significant price effect, which from the hedger’s viewpoint
implies a large transactions cost (Gray 1960, 1967; Peck 1980).

Although the classification of positions as hedges or speculations is often useful
(and necessary for regulatory purposes), scholars also have long recognized
that hedges have speculative elements (e.g., Paul). Thus, given the necessity of
speculation for hedging and the speculative aspects of hedges, one is inevitably
led to the structure and conduct of all traders in assessing the performance of a
market.

The Commodity Futures Trading Commission (CFTC) publishes the share of
open interest held by large traders, both short and long. The level of
concentration is usually small, but differences exist among markets (see e.g.,
Paul, et al.). The level of concentration for a particular market can vary with the
passage of time. For most contracts, concentration tends to increase as the
maturity date approaches and open interest declines. Futures markets typically
are hedging markets, but the proportion of open interest which is classified as
hedging varies greatly among markets, as is illustrated by Table 1. Detail is
typically lacking on the nature of small traders.

Table 1. Average open interest by type of trader, selected markets,
October 1977—September 1978

<table>
<thead>
<tr>
<th>Market</th>
<th>Open Interest</th>
<th>Large traders</th>
<th>Speculative %</th>
<th>Hedging %</th>
<th>Small traders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Long Short</td>
<td>Long Short</td>
<td>Long Short</td>
<td></td>
</tr>
<tr>
<td>CBT wheat</td>
<td>212.4^b</td>
<td>8.3 4.1</td>
<td>35.1 50.3</td>
<td>40.2 28.6</td>
<td></td>
</tr>
<tr>
<td>CBT soybeans</td>
<td>510.2^b</td>
<td>5.6 2.4</td>
<td>33.1 38.5</td>
<td>37.2 35.0</td>
<td></td>
</tr>
<tr>
<td>CME live cattle</td>
<td>73.2^c</td>
<td>29.5 4.3</td>
<td>6.6 45.6</td>
<td>53.2 39.3</td>
<td></td>
</tr>
<tr>
<td>CME pork bellies</td>
<td>10.0^e</td>
<td>22.2 19.4</td>
<td>1.9 8.7</td>
<td>59.4 55.4</td>
<td></td>
</tr>
<tr>
<td>NYME potatoes</td>
<td>12.9^f</td>
<td>20.2 19.0</td>
<td>4.8 33.5</td>
<td>66.8 39.3</td>
<td></td>
</tr>
<tr>
<td>NY orange juice</td>
<td>12.5^g</td>
<td>5.1 4.4</td>
<td>46.6 43.8</td>
<td>36.8 40.3</td>
<td></td>
</tr>
</tbody>
</table>

^a Long and short percentages each must total 100. The omitted figures are spread positions held by
large speculators. To obtain this number either for the long or short side, add the 3 columns shown
and subtract from 100.
^b In million bushels.
^c In thousand contracts.

The efficiency of transmission of information and the proportion or number of
informed traders are treated as structural characteristics in some theoretical
models (e.g., Grossman and Stiglitz; Cox). Such models assume behavior
except that information is costly, and performance is permitted to vary as the
proportion of informed traders varies. Critics of futures markets have alleged
that “too many” uninformed traders exist.
Contracts are, of course, homogeneous for any particular market, but contracts can have imperfections which result in market squeezes and/or little use. Powers (1967) has pointed to the influence of contract provisions on the success of a new market, and the lack of changes in contract provisions relative to changes in the underlying industry can result in declining use and possibly of market failures (Paul, et al.).

The structure of spot markets also is important in the sense that concentration in spot markets may imply concentration in hedge positions. Caves (1977-78) has argued, however, that the grain markets are relatively competitive notwithstanding the dominance of a few firms in grain processing and exporting. But this remains a controversial issue (Morgan).

Even if the spot market is competitive, the introduction of a futures market can be a low-cost way of entering into forward contracts, and they help producers and marketers specialize in the functions they can best perform. Futures markets presumably assist in the transmission and appraisal of market information, but if the spot market already has a well-developed information system, it is not clear whether a futures market will have a measurable influence on the transmission of information. Moreover, the addition of a futures market is not an "either-or" situation; some futures markets grow and mature; some remain thinly traded; and mature markets have sometimes declined.

In sum, the types of traders and their roles have been well described, and the literature also has done a good job of discussing the consequences of inadequate speculation. But, except for official statistics for large traders, we do not have good descriptions of the structure of traders across markets. A few comprehensive surveys of all traders in one market have been made (e.g., USDA 1970), but research has not clearly identified the role of various structural characteristics in imperfect futures markets. Little is known about how well traders are informed, the sources of information, and the role of insider information (but see Heifner, et al.) Structure clearly differs across contracts and markets and over time within a single market; little has been done to explain the differences and changes in structure. Finally, research needs to be concerned with the incentives and rules for maintaining and increasing the competitiveness of markets. The growing size of hedges, the differences among traders in access to information, and the larger financial resources available to some speculators may lessen competition even in large, well-developed markets which, in the past, have been accepted as competitive.

Trader conduct

In the industrial organization literature, conduct has to do with firms’ policies toward setting prices, determining product attributes, and perhaps coercing or manipulating the behavior of rivals (Caves 1977, p. 50). In a competitive market, firms by definition have little freedom of choice. Consequently, to the

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8 Futures contracts have a significant advantage over forward contracts in spot markets in terms of integrity. Since gains and losses in futures are taken as they occur, less incentive exists to renege on futures contracts (Gray 1976).

9 About 60 of the 125 approved contracts are dormant or have "small" volumes. The CFTC is apparently concerned about the manipulative potential in such markets (The Wall Street Journal, October 22, 1980, p. 3).
extent that futures markets are competitive, there is little to be said about
court, and, indeed, the literature is relatively sparse.

Holbrook Working (1967) has documented the actions of a single scalper in the
Chicago wheat market. This is clearly a record of an individual reacting to the
market rather than “making” the market. Working also cites the evidence of a
floor trader in cotton who in 1952 averaged a net profit of $260 per day and 71
transactions per day. The most striking aspect of the data, however, is the
variability in returns and transactions from day to day. In a two-month period,
the trader’s returns ranged from a positive $4,364 to a negative $3,116 (1952
prices). Professional speculators, on average, make profits; speculation is their
business. For the scalper, the profits are a return for providing liquidity.

A few studies have described the aggregate conduct of speculators. Olson, for
example, had access to data covering 48 trading days in 1967-68 in the potato
market. He concluded that floor traders, trading for their own account, were
neither initiators nor strong supporters of short-term price movements. The
preponderance of evidence is consistent with the idea that floor traders earn
profits by providing market liquidity.

Other studies have considered the relationship of price changes to transactions
by large speculators and the profits earned by large speculators (e.g., U.S.
House 1980; USDA 1962; Hoffman). Using data for individual speculators in
wheat and corn in the 1920s, Hoffman (p. 49) inferred that “when the trading
of market leaders results in large purchases or sales within comparatively brief
periods of time, it is capable of causing price to move with trading—if
purchases, upward; if sales, downward.” A scenario can be developed in which
a succession of bids or offers to fill a large order can lead to price changes.
Hence, even though each sale is necessarily “balanced” by a purchase (and vice
versa), it is not especially surprising that large trades have measurable price
effects (see also USDA 1962).

Clearly, since the sum of returns to trading in futures is zero, not all traders
earn positive returns. Position traders attempt to profit from superior
forecasting skills. In some instances, inside information has improved
forecasts, and, in other instances, large, presumably knowledgeable traders
have made serious errors (for illustrations, see Morgan or Hoffman). On
balance, however, large professional speculators tend to earn profits while
small, avocational speculators are losers (Stewart; U.S. House 1980).

A long-standing concern is that speculators succumb to mass psychology,
thereby perpetuating unwarranted trends in prices (e.g., see citations in
Hieronymus). A modern version of this concern is the increasing reliance of
traders on charts, moving averages, or other computerized decision aids. Since
these traders are using similar data and methods, their collective actions may
have important, but erroneous, influences on prices even though individual
traders are small and their single transaction would have no influence on price
(Paul).

A USDA (1962) report asserts that price movements are accentuated by the
entry and exit of large numbers of small traders who are attracted to a market
by price rises. In contrast, the literature, discussed below, on the random walk
nature of price changes is generally not consistent with the “mass psychology”
hypothesis. But price rises (and the seemingly inevitable declines which follow) must be treated as case studies in which the actions of small traders are analyzed in detail. In general, such evidence is not available.

Explicit anticompetitive conduct also is a possibility. If one or a few traders have great market power, they can influence price levels. This is alleged to have occurred in the silver market (Maidenberg). Usually the financial resources required to move prices to a disequilibrium level are very large, and even if the trader succeeds in manipulating prices in his or her favor, the prices may very well return to the former level when the trader attempts to take profits. Consequently, the probabilities for success in manipulating price levels over a long time period are thought to be small. In addition, speculative position limits, where they are imposed by exchanges and by the CFTC, help to curb market power.

A market corner, as usually defined, does involve explicit coercive conduct. A corner occurs, for example, when a trader has a large portion of the long positions in futures and of the deliverable supply of the commodity. Thus, sellers are coerced into buying back their futures positions at prices named by the manipulator.

Such explicit corners are a rarity today; squeezes are more common. Astute traders can identify situations when delivery would be costly. Transportation problems and availability of storage space may limit deliverable stocks relative to the open interest (and relative to total commercial stocks). Moreover, even if the level of trader concentration has been small throughout the life of a contract, it can become large near the expiration date as traders liquidate their positions (Paul, et al.) The consequence of a squeeze is the distortion of price spreads between different futures contracts and/or between cash and futures prices, especially near the contract maturity (Paul). Unusually large deliveries may signify a potential problem.

Formal proof of a squeeze or manipulation is usually difficult. Research must establish the normal price spreads and the nature of the distortion, if any, from the normal spread. Moreover, one must show that the distortion arose from the conduct of the alleged manipulator. An even more difficult case is the one of threatened manipulation. Can the CFTC anticipate and prevent a manipulation? The hearings and reports on the allegation of a threatened manipulation of the March 1979 wheat contract illustrate these difficulties (U.S. House 1979; Heifner 1980).

A modest amount of research and writing has been directed toward the issue of distortions in prices arising from anticompetitive conduct. Proposed remedies can be either “negative” or “positive.” Negative remedies involve specific prohibitions or constraints such as position limits and margin requirements, which can be adjusted periodically. Positive remedies involve changing contract terms in ways which encourage broader use and minimize the potential for a squeeze (Paul, et al.) All proposals, however, have advantages and disadvantages, and much of the past research has appraised the applicability of specific remedies to particular contracts (Nathan Associates; Paul; Paul, et al.; Heifner 1980).
Performance of prices

The academic literature on the price effects of futures trading includes both theoretical models and empirical analyses. Considerable research has been concerned with the influence, if any, of futures trading on the performance of cash prices. Some research has examined the behavior of futures prices alone. In total, many pieces of empirical research on the price effects of futures trading have been conducted, but few have addressed specific allegations of manipulation or unwarranted movements caused by ill-informed traders.

Theoretical models

A time series of cash prices can be viewed as composed of systematic and random components. The systematic portion, in turn, consists of cyclical, trend, and seasonal components, and these categories provide a useful framework for discussing the literature on the price effects of futures trading.

Theoretical models often assume competitive determination of cash prices, and ask, if a futures market is introduced, what is the influence on cash prices? Peck (1976), using a model in which expected prices could be based on futures quotations, concluded that the use of futures prices created convergent cycles for “virtually any reasonable combination of demand and supply parameters.” Moreover, the dampening of the cycle occurs more rapidly with than without futures trading and, in this sense, the introduction of a futures market may help stabilize prices.

The introduction of a futures market should assist decisions about carrying inventories from crop year to crop year as well as within the year. An implication of Working’s (December 1949) theory of the price of storage is that inventories and futures-cash price spreads are simultaneously determined. The effect of inventory levels on annual variability of prices is probably small relative to the overall variability of prices (Hieronymus); year-end commercial inventories are often limited to the amounts needed for the convenience of a continuous supply. But, in some years, current stocks may be relatively large and the expected crop relatively small; hence, the postharvest futures can be above the current spot price, and a positive incentive exists for carrying larger inventories into the new crop year. Thus, to the extent that futures help allocate inventories from year to year, annual price variation is reduced.

Likewise, futures trading facilitates the carrying of stocks and movement out of inventory within the crop year. Hieronymus and Gray (1963) are among the authors who have argued that seasonal variation of cash prices should be smaller with a viable futures market than without such a market. Hedgers are willing to carry larger inventories because a return to storage is assured through a hedge. Hence, harvesttime prices are higher and storage-period prices are lower than they otherwise would have been. Seasonal variability is reduced, but not eliminated. Of course, the improvement over the performance in a spot market, which has functioned reasonably well alone, may be small and difficult to measure.

Working (1958) and Samuelson (1965) have described the random walk—more precisely, martingale—character of short-term changes in futures prices. Truly new information is unpredictable and current prices are based on the existing information so that in a perfect market the expected value of the

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4 Empirical work by Gardner suggests that futures quotations may be a useful measure of expectations in supply equations.
price change is zero. In addition, Samuelson suggests that the variance of these price changes should increase as the maturity of a contract approaches, since the amount and importance of information influencing prices likely is increasing.

Samuelson (1976) has emphasized, however, that changes in cash prices need not be—indeed, should not be—random walks. Cash prices have seasonals, cycles, and trends which in a perfect market are anticipated by futures. Thus, the futures series does not have the systematic components of the spot series, and the existence of futures trading does not eliminate the systematic components in cash prices, though for the reasons given above the variance of cash prices might be reduced.

In theory, speculation in futures markets affects spot prices indirectly (Gray 1967). The literature stresses that futures markets are often a low-cost method for potential hedgers to negotiate forward contracts relative to the cash market (Telsler). Speculators help provide the needed liquidity in futures. In addition, futures markets are a low-cost way to speculate, and, hence, additional traders (speculators) are attracted to commodity markets, which can alter and presumably improve the available information (Cox). Thus, speculators assist hedgers’ decisions which improve the allocation of resources (e.g., inventories and, hence, improve price behavior. Moreover, if information really is improved, the random component of cash prices should be reduced (Powers 1970). Speculation also may influence resource allocation indirectly by assisting hedgers in the mobilization of capital (Harris and Baker). A firm may be able to borrow more against a hedged than an unhedged position, or at least the existence of a futures market permits hedgers to carry a different portfolio than if the market did not exist (say, fewer reserves to guard against unfavorable price changes).

Information is costly, and, consequently, in a typical market, traders will have varying levels of information (Grossman and Stiglitz). Critics of futures trading have contended, as mentioned above, that ill-informed amateurs are attracted to the market, while proponents have emphasized the efficacy of the aggregate effects of speculation. One probably cannot make a judgment on this issue based on logic alone, although economists have emphasized that markets with many traders are to be preferred to those with few traders.

In appraising the theoretical literature, one must remember that a perfectly competitive market is often assumed and that the relevance of the results depend on that assumption. Models which permit variation in the proportion of informed traders do consider one type of imperfection. But, in general, the theoretical models do not respond directly to allegations about imperfections in futures markets. The models, to some extent, do provide a standard against which actual behavior can be judged.

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5 A considerable literature now exists on the idea of imperfect and costly information (e.g., Figlewski; Rothschild). Cox’s paper is one of the few that uses such ideas for futures trading. Since his model contains production and storage equations which seem to implicitly assume annual price behavior, the applicability of the model to the weekly prices used in the empirical analysis is doubtful.
Empirical Results

Cash prices

Relatively little empirical evidence exists about the effects of futures trading on the systematic components of cash prices. Gray (1963), updating Working (1960), found that the seasonal variation of onion prices was smaller without futures trading than with it. But subsequent analysis of a longer time period failed to support this finding (Johnson). Seasonal variability of wheat prices in the nineteenth century was consistent with the hypothesis that futures trading reduced variability (Tomek 1971).

Futures prices were found to be rather poor predictors of the 30-month cycle in spot egg prices (Larson 1967), but this finding does not answer the question of whether or not futures trading reduced cyclical variability. Accurate forecasts might reduce variability, and futures quotations have been relatively accurate forecasts (Rausser and Just).

Since the springtime price of the harvesttime futures for potatoes is less variable than the cash price (Tomek and Gray), this may reduce the variability of acreage planted. The acreage data for Maine potatoes, which have had an active futures market, are consistent with this idea (Gray 1972).

A pervasive methodological problem in comparing pre- or post-futures periods with futures trading periods is the inability of the researcher to hold "other things" constant. For example, in the period when futures trading for wheat started, many improvements in marketing also were occurring, such as the growth of the rail network. Thus, as many analysts have pointed out, it is difficult to attribute a change in price behavior to a single factor, and as Shepherd (p. 182) has aptly stated, "... It is a natural mistake to ascribe the change in price to the factor you are interested in."

A partial response to this problem is to consider only the random component of cash prices. This is the approach taken by Powers (1970). Using the variate difference technique to eliminate the systematic part of weekly cash prices, he compared the variances of the random component before futures trading and with futures trading. Cox's empirical analysis can be given a similar interpretation. Both analysts found smaller variances of the random component with futures trading than without, and both analysts interpreted the result as being consistent with improved information reducing the "noise" in a price series.

For the livestock items considered in the papers by Cox and by Powers, the time period with futures trading was fairly short and included years with rather small volumes of trading. Thus, Tomek (forthcoming) tried to replicate their results for cattle and hogs using a time period with a larger volume of futures trading, but he found no difference in the variances of the random components of cash prices for the futures and pre-futures periods. In Johnson's research, the random component of onion prices was somewhat larger relative to the total variance of prices in the period with futures trading. In contrast, Purcell, et al. found that for live cattle the variance of the random component relative to the total variance was smaller after active trading in futures started. In sum, the evidence is mixed, but with some tendency for the variance of the random component of cash prices being smaller with the existence of a futures market. In this sense, speculation appears to reduce the variability of prices.
Futures prices

Perhaps the most extensive analyses have been conducted for short-time changes in futures prices. Since theory suggests that in a perfect market the expected value of the (say, daily) change in futures prices is zero, a number of analysts have set out to test this hypothesis. Publications by Cargill and Rausser, Heifner (1977), Leuthold, and Mann and Heifner illustrate the range of results available as well as provide references to other papers.

These studies have often found deviations from the random walk model, which is not surprising as perfect markets would be infinitely costly. But the imperfections found are usually small, and do not appear large enough to provide for profitable speculation. This result seems inconsistent with the wide use of moving averages and other trend-following decision aids in commodity speculation. Articles in the trade press certainly claim that seasonals and cycles exist in futures quotations (for just two examples of this large literature, see Bressert and Bernstein). A graph of a random walk can appear to have systematic components, and the estimation of the true systematic components, if any exist, can be very difficult. On the other hand, the particular statistical methods used could have affected the results obtained in both the academic and popular literature.

Fama classifies the tests of the efficient market hypothesis as weak, semistrong, and strong form. Most of the empirical research on futures markets is a test of the weak form hypothesis, namely that current prices discount the information contained in the history of prices. Leuthold and Hartman develop what they consider to be a semistrong form test by comparing the predictive ability of an econometric model for hog prices with the quotations generated by the hog futures market. They maintain that in certain time periods their econometric model did better than the futures market. Hence, the semistrong form hypothesis for hog futures is rejected. That is, this market did not utilize all available information and, in this sense, was not efficient. In separate comments, Panton and Pasour have questioned the Leuthold and Hartman paper. Also, Rausser and Just have found that futures quotations are usually better predictors than the commercially available econometric models.

A few studies have considered Samuelson's hypothesis that the variance of changes in prices increases as the maturity date of the contract approaches (Miller, Rutledge 1976). The hypothesis appears appropriate for perishables or semiperishables like live cattle or potatoes, but probably not for the grains. The entire constellation of prices for the grains is closely linked through inventories, and, consequently, price changes for near and distant futures are closely related.

Excessive speculation in the May contract for Maine potatoes was alleged to have resulted in more volatile price changes for that futures than for the March and April contracts. The empirical evidence, however, does not support the allegation; the volume of trading in May futures certainly did grow relative to the other contracts, but there was no corresponding increase in price variability (Paul, et al.)

Cash-futures relationships

A vast literature exists on basis relationships. Much of this literature is descriptive and oriented toward decision-making by potential hedgers. It will not be reviewed. A much more limited number of publications has considered the effects of market imperfections on cash-futures differences. Paul nicely
illustrates the theoretical effects of a squeeze on price differences. But, as he points out, the lack of good information on cash prices hinders the investigation of the price effects of a squeeze.

In addition, observed price differences are subject to varying interpretations. For example, the March 1979 futures for wheat in Chicago had a large premium over May and over the March contracts in Kansas City and Minneapolis. Moreover, the futures-cash spread in Chicago was considered abnormally large by the CFTC. In contrast, the Board of Trade’s position was that the price differences were explainable in terms of the existing economic conditions and that they did not reflect artificiality or manipulation (U.S. House 1979). That is, price spreads might be unusual relative to historical relationships, but not necessarily inappropriate for current conditions.

Some recent research has sought to ascertain whether causation runs from futures to cash prices or vice versa. When the cash and futures price series both pertain to the same commodity, say, choice steers, price determination appears to be simultaneous. One cannot ascertain a direction of causation, and this result is consistent with the idea of both markets working reasonably well. Purcell, et al. did find a one-day lag between changes in the price of live cattle (choice steers) futures and changes in cash prices for feeder calves. Some friction and observable lag between the forthcoming output and the current input market is plausible.

Rutledge (1979) uses volume of trading as a proxy for volume of speculation and undertook a causal analysis between volume and changes in futures prices. In 80 of the 136 cases (contracts) examined, the direction of causality could not be identified, and, in 23 cases, no relationship appeared to exist. In only two cases did causality run from volume to price changes. Rutledge took this as evidence that speculation does not induce price variability, but rather is a response to it. Moreover, since futures and spot prices tend to be simultaneously determined, the two pieces of evidence might be combined to argue that speculation in futures does not induce increases in the variability of cash prices.

Opposition to futures trading by farmers is as old as futures markets, and it persists today. Futures markets have been attacked by farmers because prices were “too low” and by others because they were “too high” (see citations in Gray and Rutledge). There is little evidence that futures markets are frequently in serious disequilibrium over significant periods of time. These attacks are analogous to killing the messenger who brings an unpleasant message.

I think it is fair to say, however, that much of our research has not addressed, at least directly, the public policy concerns of farmers and others. These concerns cannot be dismissed. The early history of futures trading is replete with manipulations and attempted manipulations (Gray and Rutledge), and although market surveillance is now substantial, given human nature, attempted manipulations are unavoidable. Even unsuccessful (i.e.,

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4 Potato prices in Maine were alleged to have been significantly below other potato prices as a consequence of futures trading, but empirical analyses did not support the allegation (Emerson and Tomek). Soybean and silver prices also are thought to have been in significant disequilibria for a period of months (Maldenberg; USDA 1962).
unprofitable to the manipulator) attempts at manipulation can cause temporary, unwarranted fluctuations in prices. In addition, even if deliberate illegal activity is rare, large numbers of uninformed and unskilled speculators might cause runs and fluctuations in prices not warranted by basic economic forces. Thus, a larger portion of our research efforts might be addressed to these issues.

The evidence outlined above can be construed as inconsistent with markets being dominated by poorly informed speculators; autocorrelations in prices apparently are small. Nonetheless, markets, at times, might be dominated by irrational mass psychology; price movements in one market, like soybeans, sometimes appear to be illogically linked to movements in other markets, like silver; and as already mentioned, trend-following techniques have strong proponents. Thus, the statistical evidence seems at variance with common views about market behavior.

The analysis of irrational or manipulative speculation is related to the magnitude and distribution of pricing errors. In considering these errors, a distinction should be made between necessary and unnecessary errors (Working, May 1949). A price may be correct in light of current information, but prove incorrect in light of subsequent, unpredictable information; in Working’s terms, this is a necessary (unavoidable) error. Errors are unnecessary if unwarranted in light of known information; the market has not used existing information or has used it inappropriately. Also, the “goodness” of a market can be measured by the rapidity and correctness of responses to new information. Public policy should be concerned with improving market performance.

Research in this area is methodologically difficult. How does one decide that a run in prices has occurred and is unwarranted? What constitutes full adjustment to a particular piece of news? Larson (1960) is one of the few analysts to work in this area. Using Working’s H statistic, he attempted to examine the response of futures prices to market news. For corn futures, Larson states that “81 percent of the price effect of demand and supply influences occurs on a single day,” and of the remaining adjustment, an 8 percent negative reaction occurs over four days, giving a final 27 percent adjustment over 45 days. If these estimates are correct, the corn market, at the time of analysis, made a major portion of the adjustment rapidly, but had a difficult time in making the full adjustment.

The analysis of squeezes also is difficult. High-quality research will depend on having abundant data of high quality to compute price spreads and having appropriate models to explain variations in the price spreads. The price effect of a squeeze is an otherwise unexplained residual in the price spreads (Paul). Since inappropriate spreads are a symptom or consequence of imperfections, research also needs to explore the source of the problem—the imperfection in the structure and conduct of the market (e.g., Paul, et al.) Have contract terms become outdated in light of changes in the cash market? Has concentration increased in particular contracts at particular times? What are the possible remedies for these imperfections? Relatively little is known about how to influence structure and improve performance in futures markets.
A lack of speculation also can be a serious structural defect. Past research has
done a good job of explaining the necessity of speculation for hedging.
Holbrook Working, as already discussed, emphasized the differing roles of
various types of speculators, and Gray (1960, 1967) and Peck (1980), among
others, have analyzed the potential problems and price effects of a lack of
speculation. Although the research base is good, I am not sure that the
implications for public policy are fully appreciated. To be successful, markets
must have adequate liquidity, but on the other hand, is it possible to have “too
much” speculation?

A different strand of public policy-related research is the analysis of futures
markets as a deliberate method of influencing inventory holdings and prices
(Houthakker; Lermer; McKinnon; Richardson and Farris). Houthakker, for
example, appears to believe that market participants do not take a sufficiently
long-run view. A more relevant argument perhaps is that little information
exists 12 to 15 months before contract maturity to influence prices and, hence,
for prices to change or markets to be active (Samuelson 1965, 1976). In any
case, the Houthakker idea apparently is for a governmental authority to trade
in futures so as to influence year-to-year inventory holdings and to stabilize
prices. In an empirical analysis of such a proposal for soybeans, Richardson
and Farris found that prices would not have been smoothed under the
conditions that prevailed in the 1953-1967 study period. One must certainly
have some doubts whether anyone has the knowledge and expertise to use
futures markets to smooth long-term cycles, although this might be a
researchable question. A recent concern has been the possible intervention of
foreign governments in commodity markets to force prices to disequilibrium
levels.

Conclusion

A large number of references exist on the price effects of speculation, and these
publications do provide insights into the structure, conduct, and performance
of futures markets. But, of course, our knowledge is far from complete. The
limitations in knowledge are most obvious for controversial, public policy
topics, and this is not surprising. The methodology of economics is not good
enough to provide “the” answer to specific questions, and when controversy
exists, the two sides will naturally interpret data in different ways. This should
not, however, stop the search for understanding of the performance of futures
markets. The general objective should be to assist decision-makers, both in the
private and public sectors, in their search for improved market performance.
References


Paul Farris: You talked about the effect of speculation on futures market performance. There have been suggestions and quite a bit of discussion about the effects of speculation on general market performance, that is, the effect on the marketing system and its effectiveness and efficiency. Do you want to comment on that?

Bill Tomek: It seems to me that the conventional wisdom of economics, if taken literally, holds that speculation is beneficial. In fairness to the people who are concerned about the negative effect of speculation, I think we should say that our typical implicit model assumes that these traders—both speculators and hedgers—have on the average reasonable knowledge. So implicit in saying that speculation is beneficial is the idea that on balance these people are making informed decisions. Conceptually one could possibly argue that you could have a market where there are many ill-informed people and a resultant disequilibrium in prices and unnecessary price variation. But I would hazard the guess that it doesn’t happen very often. For their own self-interest, traders are reasonably well informed.

Paul Farris: Another aspect of that might be that some traders are more efficient in bearing risk. As a result, if risk is transferred to those who can bear it most efficiently, the performance of the entire system is improved.

Bill Tomek: That idea was implicit in my answer. If people are making informed judgments, things like this will happen.

Ralph Behr: You made brief mention of the effect of government policy on commodity markets. Can you identify any literature, either in economics or law, on that area?

Bill Tomek: Do you mean literature with explicit examples of government policy which influenced behavior?

Ralph Behr: Yes, either in a legal or economic analysis. Within the recent year we had the de facto embargo by the longshoremen which culminated in the Russian embargo. Are there any studies in law or economics in that area?

Bill Tomek: Perhaps someone in the audience can think of some. The literature I’m more familiar with is much more in the realm of proposed interventions rather than empirical studies of actual effects of interventions.

Jeffrey Williams: There is the example of the closing of the futures exchanges in World War I, and then the price controls on wheat that were chronicled by a man named Frank Surface who was in charge of part of the control of wheat. That was clearly a case where the government intervened in the futures market.

Bill Tomek: Also, government price support programs have influenced the volume and activity of the futures markets.

Lawrence Hunt: I’d like to come back to the earlier theme concerning the value of the futures market in increasing information available not only for the industry itself but also perhaps for others who may use the industry. Do you have any feeling about these secondary values of futures markets—namely how they increase information and improve overall market performance?

Bill Tomek: I think that is certainly the common argument and to some extent the argument is supported by the empirical evidence. I don’t know how far I want to carry it, though. There is only so much information out there. One could make the argument that there are few very well-informed people, and the market then disseminates what they already know. You could certainly argue that in people’s self-interest they either have to be informed or they soon lose enough money and are no longer traders. Then a new crop of ill-informed people come on. It’s still a possibility to have a large
number of traders who are not very well informed.

Robert Bain: You touched on the relationship between what you call a perfect or random walk market and the popularity of a trend following a tight behavior in the futures markets. Could you elaborate on that or describe what, if any, literature there is that would appear to reconcile those points? Do you have any thoughts to explain for the noneconomist how they coexist?

Bill Tomek: I will be happy to try to elaborate, but I won’t try to reconcile. Some of the economists here can help on the reconciliation. I cite two references in Commodities magazine where one writer suggests you can identify cycles in futures prices—cycles longer than a year. Another suggests you can identify seasonal behavior in futures prices. In my view, that is inconsistent with the random walk idea in which presumably current prices already reflect existing information, and the expected value of the price change is zero. Therefore, how could one argue that given this kind of price series one can identify cycles or seasonals which have predictive value. To me those are inconsistent arguments. In a recent issue of Commodities, there were articles on seasonals and cycles and an article from some chap who had written a master's thesis showing how beef cattle prices were indeed a random walk. These two articles coexisted next to each other. Is that inconsistent? It seems to me that it is.

Michael Magill: In a world in which there are transaction costs, you could have a certain amount of regularity, and yet it wouldn’t be worthwhile for some of the agents to exploit it. In other words, the data could still support some kind of regularity, but it might not be worthwhile for agents to pick up on it.

Bill Tomek: But presumably the people using these trend-following devices think they are profitable.

Michael Magill: Ah, but that’s a matter of degree.

Terry Martell: You presume too much. Most of those people earn their income by selling their services, not necessarily by personally trading.

I’m not sure there is anything at all to reconcile here. Just because it is used, a practice does not have to be correct. The literature in this area is quite clear. I have often wondered why, if these systems are so profitable, any one person would advertise the existence of such a system in Commodities magazine and not just sit back and reap the advantages of this purportedly efficient way to extract millions of dollars from the market.

Bill Tomek: I certainly agree with that.

Gail Cramer: Bill, if you look at oligopolistic markets like the grain export industry, do futures prices in the grain market move toward a competitive solution, or do you see them moving toward an all-oligopolistic solution to prices, especially if traders are informed? If they are informed and know that it is an oligopolistic industry, at least at the export level, you would expect them to move toward oligopolistic prices. Do you have a comment on this?

Bill Tomek: Not really. I commented on that in my paper, but here I just pointed it out as an issue.

Gail Cramer: Out in the countryside, producers are very worried about this particular issue. When I try to go through the market structure and tell them it’s a competitive industry, they say, “Cramer, you’re crazy. You know they control the price, and that informed traders are going to use that information and move to an imperfectly competitive price.”

Bill Tomek: The argument of the farmers you are quoting certainly has been made. On the other hand, Professor Caves published an article suggesting that this really was a relatively competitive market, while others in our profession have argued to the contrary. I don’t feel I’m sufficiently expert on the grain industry in particular to reach a conclusion.

Gail Cramer: I think there are very few people who would deny that the export market is imperfectly competitive. I don’t think most would agree with Caves’s argument at that level.

Dave Hirschfeld: There seems to be an overwhelming consensus that futures markets
serve at least some beneficial aspects for the market with respect to either mediating price relativity, seasonality, or price discovery. But the literature doesn't seem to be very wide in its interpretation of the regulations imposed upon the futures market. Have you seen anything along these lines?

Bill Tomek: Not very much. It seems to me that the only literature that exists is the other way around. Someone thinks there is a problem. Then there's either some verbal analysis or perhaps even a modest amount of empirical analysis. What would happen, they ask, if we raise margins or restrict the size of speculative holdings or change the rules of the game a little bit? I think we need to do more in this area.

Henry Arthur: My question concerns what you included in your survey of literature. Doesn't that literature include—even though we as economists reject most of it—such things as congressional inquiries and news stories? Here the question of corners and manipulation have been given a lot of attention. Is there a way we can extract economic truth, if you will, from that sort of material?

Bill Tomek: My paper has a limited number of citations of this type of literature. For example, I cite the 1979 hearings on the wheat contract and a few others. It seems to me the literature is much better at stating the allegations on both sides of the argument. To some extent, it defines the problem and gives some analysis. In the wheat hearings, there is much data on price spreads and interpretations of these price spreads in an economic sense. But the hearings literature is more a "quickie" and problem definition type of research than an extensive analysis. The literature isn't very serious economic research. I'm not sure, though, that if one did a much longer study whether the results would be any better.

Henry Arthur: Perhaps one of the jobs economists should take hold of is to try to arrive at an appraisal as to whether the allegations of this quickie kind of literature are asking the right kind of questions or not.

Bill Tomek: While much of the literature is boring, much of it is quite fascinating reading.

It's an excellent starting place for some research.

Henry Arthur: I have one other comment. The litigation aspect is searching, I think, for economic truth as well as public relations. For that reason, the economist may have a problem he is going to have to grapple with in order to provide some kind of bridge to help the litigation process become more effective.

Bill Tomek: I agree. I think we have done some research, but somehow it doesn't really come to grips with many of the questions being asked, particularly, the litigation questions.

Reynold Dahl: I would like to return to the paradox between the results of the random walk analysis and the behavior of futures prices and the value of charting and trend following. I happen to be an employee of a land-grant college in the Midwest. I have noted the demands coming from the country to the extension economist to do some work on charting—to teach farmers and students how to chart and also to do point and figure charts, moving average charts, and what have you. Don't you think that this is an indication that we need to do some more study in this area to decide if we should undertake this type of work, if you can call it that?

Bill Tomek: I will give a qualified "yes." I would even support your background statement. I'm aware of at least one land-grant university in which there are formal publications and extension advice given to farmers on decision-making based on moving averages and charting. That would make me personally nervous, but maybe it works. At least we have to be in a position in land-grant universities of trying to determine whether this really does help decision-making by farmers.

Dave Hirschfeld: My impression is that the literature seems to be geared more toward trade journals. Do you think there's enough literature in General Political Economy or American Economic Review? Do you think that the economics profession as a whole has looked at this as widely as, say, other issues that are more appealing to the economics profession? Do you
think the futures industry is taken seriously in these journals?

Bill Tomek: I would give a qualified “yes,” particularly today. There was a long period when very few people worked on futures markets, but today there is a resurgence of interest. It would be subjective to say whether or not these people are working on the right questions.

Michael Magill: I’m going to be a little outrageous. As an economist and a classical reader of economics, I think it’s unfortunate that people like Keynes and Hicks, whose names are sort of biblical in their authority, should have had so much unfortunate influence. It seems to me that the degree and extent of careful, modern, proper analysis of futures markets has certainly not been commensurate with the degree of their importance. I take a sort of strangely defensive attitude. There are tremendous parallels between the securities markets which study the longer run trends in which the economy behaves and the specific shorter run behavior of particular commodities which are really the purview of the futures markets. I don’t think there’s any reason why people should be embarrassed that, in a situation where things depend on expectations, those expectations might sometimes go wrong. Samuelson has been a person who has always been fascinated by the way in which bubbles must burst.

As an economist, I simply do not think that the economics profession has given futures markets the kind of careful attention it deserves. Futures markets are particularly sophisticated and clever mechanisms for handling certain types of risks. I think it would be nice if someone made a more systematic study based on the rather substantial literature. There’s a lot of bible discussion but not much formal discussion of exactly how futures markets act.

Warren Lebeck: I can’t resist answering by saying that if Mohammed won’t come to the mountain, why do you suppose we have come to you? Why do you suppose we’re here?

But, professor, I have a question for you. One of the few words you use that I as a layman can understand is literature. What is your definition of literature? I tell you why I ask. You talked about Neal Smith’s Small Business Subcommittee Report and I presume you meant that was literature. Then you talked about bankers and hedging and said there was no literature indicating that bankers would lend more money on hedged positions. In my 25 years in this business I have listened to many bankers and I’ve read a lot that they have written. I read and listened to a lot by those in the commercial end of the business who said that’s true. I gather you don’t consider that literature. So, will you tell me what literature is?

Bill Tomek: I think you slightly misinterpreted one of my comments. It is true, though, that I have referenced primarily what academics have written, not what nonacademics have written. There is some literature suggesting mixed opinion about whether bankers will make additional loans on hedged positions. There are certainly bankers who say they will, but I can also cite cases where surveys have been taken of small country bankers who say they won’t loan any more on a hedged position.

Warren Lebeck: That’s why they are small country banks.

Lloyd Besant: I think I can answer this. We conduct seminars all around the country with ag bankers. They are just beginning to move in this direction because the farmers are requesting them to. They wouldn’t attend seminars four years ago; now they want them.

Philip Garcia: There was recent paper put out by Chet Baker and Kim Harris which addressed this issue.

Tom Hieronymus: I read that paper and reached the conclusion that it was somewhat marginal, but that it did make a difference.

Bill Tomek: I was trying to say that there has not been enough research. There has been just a limited number of researchers—a few of them are sitting around this room—who have worked a long time on futures markets. They have made a contribution to the literature and I think more is being done. We have to recognize that all of us have limited talents, and that, by definition,
giants of the profession are limited in number. I wish we had many Holbrook Workings running around in our profession, but by definition there aren’t too many.

**Tom Hieronymus:** In this connection, one of my favorite sayings comes from Roger Gray: economists act as if markets were a gift of God, and that we don’t really need to bother with their examination. I think this is the point you were making. It just hasn’t been done.

**Bill Tomek:** I’ll accept that.

**Bob Bear:** Regarding the issues of competition, performance, and market efficiency, it seems to me there are some factors that we still need to give more consideration to. The basic fact of interest to me is after-tax, risk-adjusted, return on investment. Have we adequately defined risk in commodities markets to speculators and hedgers? For example, have we considered the after-tax consequences of futures trading? Have we fully considered commissions and margin levels which form the basis of investment return? What about the execution process itself? How much depth at any given price do we have in these markets? I don’t think much research has focused on these questions, many of which are somewhat institutional in nature. Until there is more, we will not get the understanding that we should have.

**Bill Tomek:** I agree with your last statement. We have had a difficult time researching the institutional types of questions.

**Bob Bear:** It’s very difficult to get readily available data on these questions. Perhaps that’s part of the problem that many of us have in the academic community.
Research on Speculation Seminar Report

November 6 and 7, 1980

Chicago Board of Trade