THE ROLE OF ECONOMIC ANALYSIS IN FUTURES MARKET REGULATION

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The history of regulation of commodity futures markets manifests persistent concern over "excessive speculation." The phrase is found repeatedly in the hearings leading to the earliest federal statute--the Grain Futures Act of 1922--and it reappears in each subsequent revision of the statute, including the two major ones; the Commodity Exchange Act of 1936 and the Commodity Futures Trading Act of 1974 (Cowing, Rainbolt). A substantial revision in the Commodity Exchange Act in 1968 was also largely an outgrowth of the notorious vegetable oil swindle of 1963. The phrase "excessive speculation" has not been defined, much less quantified, in the statutes, even though the phrase is used specifically to justify the creation of limits on speculative positions. The economic literature has recognized the need for and importance of speculation and even has provided evidence of speculative inadequacy as a chronic affliction of some futures markets (Gray, 1960 and 1967). A major effort to fill the definitional void was Working's construction of a speculative index (1960). Whereas the term "excessive" is employed in the pejorative sense in the congressional deliberations, Working simply undertook to use market statistics to describe the relationship between hedging and speculation. His research led to a measure, the speculative index, which reflects the extent by which the level of speculation exceeds the minimum necessary to absorb long and short hedging, recognizing that long and short hedging positions could not always be expected to offset each other even in markets where these positions were of comparable magnitudes. Speculation

above the minimum defined by the index was not defined simultaneously as excessive. Indeed, in some markets whose performance is demonstrably hampered by speculative inadequacy, the level of speculation exceeds that minimum.

It is important in any effort to arrive at a definition of "excessive speculation" to keep market performance criteria in mind, and to distinguish between characteristic levels of speculation in different markets over time and episodic flurries of speculation in a particular market which may reflect underlying fundamentals but which may otherwise suggest price distortion or price manipulation. Market regulation, whether at the exchange or government level, is concerned with preventing abuses and has its focus upon particular episodes or crises. The economist, while remaining cognizant of the potential for abuse, needs to try to understand why levels of speculation vary so widely across markets as a continuing phenomenon, and how market performance may be related to such variation. As but one example, data presented in this paper will confirm that the pork belly futures market is much more speculative than the wheat futures market, yet speculative abuse (or the threat of abuse) has been charged several times in recent years in wheat futures and not in pork belly futures.

This paper does not directly address the questions of episodic market distortion or manipulation, although economic research has its bearing on these problems too. Rather what is undertaken here is an assessment of the speculative character of selected markets with particular reference to the impact of changed hedging requirements upon

the speculative component in recent years. The overall market performance issue will then be revisited in the context of the three wheat futures markets, and the caveat will be reiterated that less speculation does not make for better markets.

Measures of Speculation on Eight Futures Markets

Estimates of speculation and hedging participation in most futures markets are available monthly from the Commodity Futures Trading Commission "Commitments of Traders" reports. There, participants are categorized first as large or small (reporting or nonreporting) traders and then the positions of the large traders are identified as speculative, spreading or hedging. The small traders are not further classified, hence, depending upon the relative size of this group, descriptions of the market based upon these data vary in accuracy. The data do reveal basic trends in market composition. In the major agricultural markets, reported hedging has grown much more rapidly than the growth in the total market activity. In the two decades prior to 1972, long hedging in the wheat markets accounted for 23 percent of the open interest and short hedging accounted for 45 percent. Since 1972, short hedging averaged 61 percent of the open interest and long hedging was 65 percent. Similar growth in hedging use of futures market is apparent in the corn and soybean markets and some evidence of the extent of changes in the composition of the open interest on these markets is provided by the data on reported hedging ("long" and "short") in Table 1. An earlier paper describes the changes in market use evidenced by the numbers reported here in more detail and examines the relationship between hedging use and total market use (Peck).

Table 1.--Measures of the Speculative Index, Position Limits and Hedging Balance on Selected Commodity Futures Markets*

Commodity[a] Period	Speculative index[b] Lower bound	Speculative index[b] Upper bound	Position limit[c] (contracts)	Reported hedging Long (percent of open interest)	Reported hedging Short (percent of open interest)	Reported hedging Offset (percent of open interest)	Reported hedging Balance (percent of open interest)
All wheat							
1947-71	1.212 (0.151)	1.589 (0.344)	400 (1.6)	22.9	44.7	21.9	7.7
1972-77	1.040 (0.020)	1.178 (0.054)	400 (0.7)	61.1	64.6	57.7	40.6
Corn							
1948-71	1.263 (0.244)	1.609 (0.442)	400 (1.5)	23.9	46.6	22.2	9.1
1972-77	1.045 (0.017)	1.204 (0.051)	600 (0.6)	61.9	59.8	55.9	37.2
Soybeans							
1951-71	1.329 (0.245)	1.946 (0.608)	400 (1.2)	20.7	29.9	17.2	4.4
1972-77	1.061 (0.034)	1.310 (0.121)	600 (0.8)	42.2	42.0	37.2	20.5
Maine potatoes							
1952-74	1.856 (0.476)	2.923 (1.763)	350 (2.7)	7.7	33.4	7.7	0.5
Live cattle							
1971-77	1.568 (0.189)	2.173 (0.514)	n.a.	8.0	40.2	7.5	0.6
Pork bellies							
1970-77	3.656 (1.230)	8.994 (5.236)	250 (2.2)	3.4	8.2	3.0	0.0
90-Day Treasury Bills							
1978	2.021 (0.320)	3.374 (1.109)	n.a.	12.2	13.1	9.9	0.0
GNMA Mortgages							
1978	1.125 (0.034)	1.494 (0.179)	n.a.	30.9	33.4	29.9	11.0

(continued on page 5)

Table 1 continued

* Based on data from Commodity Futures Trading Commission, "Commitments of Traders," monthly (formerly available in U.S.D.A., "Annual Summary of Commodity Futures Statistics").

a The periods for wheat, corn, soybeans and Maine potatoes are crop years and the indicated year is the year of the harvest. All wheat is the sum of positions in Chicago, Kansas City and Minneapolis.

b Working's speculative index $= 1 + \frac{SS}{HS+HL}$ when $HS \geq HL$

$= 1 + \frac{SL}{HS+HL}$ when $HL > HS$

where HS and HL are total short and long hedging and SS and SL are total short and long speculation. All unmatched reported spreading was assigned as speculation. The difference between the lower and upper bound estimates is described in the text. Standard deviations appear in parentheses.

c See text for a discussion of the limits reported here. Figures in parentheses are limits as a percent of the average open interest.

Not only has the hedging component in these markets grown, but the balance between long and short hedging has become closer. Balanced long and short hedging might suggest that speculators are not needed in a market, long hedgers would offset the positions of short hedgers. One measure of the speculative character of a market uses this notion, being the speculation exceeding that required to offset any unbalanced hedging. With nearly balanced hedging, this measure would be infinitely large and would imply that markets are highly speculative. The difficulty with the net hedging concept is that individual hedgers are rarely so alike as to size and timing of their positions and as to specific delivery months to be used, that only occasionally will long and short hedging positions offset each other.

Illustration of the problem is provided in the commitments data by the separation of positions into those held in "old crop" and "other" futures. On January 31st, 1978 (when "old" and "other" divide the wheat crop year and the total positions roughly in half), reporting hedgers in Chicago wheat held 110.0 million bushels long and 114.8 million bushels short, for a net short futures position of 4.8 million bushels. In this situation, minimum required speculation could be defined as a 4.8 million bushel long position. However, hedgers' positions in "old" crop futures (March and May options) were net short 7.9 million bushels and were net <u>long</u> 3.1 million bushels in the "other" options (July, September, and December). Thus, a measure of the speculative requirement of the January 31st, 1978 Chicago wheat market ought to reflect that both long and short speculation was required to offset the net short position of hedgers.

As the balance becomes closer and the hedging component grows within a market's total composition, the likelihood of direct offset increases, but it remains uncertain. Working's speculative index (T), was constructed with the differing needs of long and short hedgers in mind. It was derived from the analysis of the relationship between long relative to short hedging and long speculation relative to short hedging. In effect, the index measures shifts in the relationship between these two variables, measuring the excess speculation over that required to offset both the long and short hedging on a market.

The difficulty in calculating Working's index, or any index, is that the positions of the small traders must be assigned as either speculative or hedging. As there is no one right way to make the assignment, two alternatives are used here. A common assumption in using these data is that most small traders are speculators. It is convenient to extend this assumption here to say that all small traders are speculators. This provides an upper bound estimate of the speculative index. A second estimate results from allocating the small positions as speculative or hedging. In a variant of the procedure suggested by Larson's work and developed by Rutledge, the distribution of hedging and speculative positions from the historic full market survey reports are used to classify the monthly, nonreporting data into its appropriate category.[1] As with Rutledge's results, the allocation model used here showed a positive relationship between the percentage of nonreporting positions which are hedging and the percent of open interest which is reported hedging. When applied to current data from the major agricultural markets and

their large hedging percentages, this procedure allocated the majority of the nonreporting positions to hedging. Hence, hedging is probably overstated and the speculative index calculated from these allocations generally provide lower bound estimates of the speculative character of the market. Both upper and lower bound estimates of the speculative index are reported in Table 1.

The markets examined include wheat, corn, soybeans, pork bellies, live cattle, Maine potatoes, 90-day Treasury Bills, and GNMA mortgages. The commodities encompass a variety of production and marketing attributes, including storable grains, nonstorable and continuously produced products, and government-secured debts. These markets also reflect a range of speculative and hedging participation as reflected in the estimates of the speculative index and the average percentages of the open interest which are reported long and short hedging. Also included in Table 1 are measures of offset hedging and balanced hedging, based on the reported hedging data only. "Offset hedging" is simply the smaller of short or long hedging, which defines the maximum amount of hedging which could be offset by other hedging. It measures the amount of hedging in a market which is mathematically balanced, ignoring the kinds of differences in long and short hedging requirements noted above. "Balanced hedging," on the other hand, takes account of the likelihood that hedging would be offsetting, given the speculative character of the market and the total amounts of long and short hedging. It is derived from Working's index. Balanced and offset hedging are calculated only for the case when all small positions are assumed to be speculative to enable direct comparisons between reported positions and the two measures of hedging balance.

The upper bound estimates of the speculative index range from 9.0 for pork bellies to 1.2 for corn and wheat in the 1972-77 period while the lower bound estimates range from only 3.7 to 1.0. As T cannot be less than one--there must be enough speculation to offset the unbalanced hedging positions--these averages are remarkably low. Interestingly, if the results for the pork belly market are ignored, then the two financial markets represent both ends of the speculative spectrum and are not dissimilar from the agricultural markets. Under both the upper and lower bound estimates, the T-Bill futures market appears to be twice as speculative as the GNMA market. This difference is mostly illusory and reflects the difficulties of intercommodity comparisons based on the reported positions data and of the accepted procedures for apportioning small positions as hedging and speculation. Reporting requirements in the two markets are identical at 25 contracts. Thus, a position in T-Bill futures representing $25 million is reportable while one of only $2.5 is reportable in GNMA's. Data from the first full market survey showed total hedging of similar proportions on both markets (Hobson). A more recent survey shows total hedging in T-Bills to have been nearly twice that on the GNMA market, a reversal of the average reported hedging results (Jaffe and Hobson). Using the allocation procedure does not alter the basic result since small trader hedging is positively correlated with reported hedging and no adjustment is made in the procedure for differences among commodities as to reporting requirements.[2]

Though the sample is quite small for these two markets (12 observations), the results were retained to provide comparisons with the agricultural markets

and to highlight the need for more careful attention to the question of reporting requirements and its effects on the description of a market provided by the positions data. Research is needed to create a better allocation scheme, one which would correct for deficiencies in the data and not exacerbate them.

Among the agricultural commodities, two distinct groups of commodities emerge, using either the upper or lower bound estimates. The wheat, corn, and soybean markets are characterized by very low relative levels of speculation. Maine potatoes, live cattle, and pork belly markets have considerably more speculation, with the belly market nearly twice as speculative as the other two. The dichotomy is especially strong if the 1972-77 indices for three major markets are used in the comparison. Speculation in contemporary wheat, corn, and soybean markets is barely adequate while that in the cattle, pork belly, and potato markets is somewhat greater.

Coincidentally, these groups of commodities are dichotomous in the levels of speculative limits which have been established. Corn, wheat, and soybean limits, set by the CFTC, are currently at 3 million bushels. While the limits in the corn and soybean markets have been at 3 million bushels since 1971 (the entire 1972-77 period), that in wheat was increased to 3 million only in August 1976. For the bulk of the 1972-77 period, a limit of 2 million bushels applied and this is shown as the limit in column 3 of Table 1. The limits for all these commodities averaged less than 1 percent of the open interest, irrespective of which limit is used for the wheat market. Limits on speculative positions in potatoes were established by the C.E.A. in 1964, those for cattle and

pork bellies are set by an exchange, and speculative positions in cattle are limited by maturity but not as an overall position. These limits are significantly greater percentages of open interest than in the three major markets, averaging more than 2 percent of their respective open interests.

These data call into question the adequacy of Commission review and evaluation procedures for the establishment of limits. Further, they suggest some intriguing possibilities for intercommodity, market performance research. Are there measurable differences in price behavior between markets with minimal speculation and those with larger amounts? Would these comparisons lead to an estimate of a desired level or even an adequate level of speculation? Speculation in the wheat market with an index of 1.04 (1.18 upper bound) may be inadequate and pork bellies at 3.66 (9.0 upper bound) may be more than adequate from the point of view of optimal market performance. The contrast between pork bellies and potatoes is also intriguing. The limits are generally more restrictive in bellies than in potatoes, yet the speculative index for bellies is larger, suggesting that more than the absolute size of the open interest needs to be considered in establishing limits.

The need for market performance research is emphasized by the significant historical changes within the corn, wheat, and soybean markets. In the decades of the 1950s and 1960s, these markets would hardly have been characterized as speculative. The soybean market, with the least amount of continuous government control, was the most active market and the speculative index was greatest. For all three markets, the speculative index has significantly decreased in the post-1972 period, the period in which

these markets have been characterized as being speculative. In reality, speculation was barely adequate on average. A related fact, documented by Gray (1980), is that, far from causing the explosive price increases of 1973-74, speculation, which was net short over the period of the price rise, obviously helped to contain it. The general inadequacy of speculation on these markets is further suggested by the extreme daily price moves; soybean futures prices, for example, frequently touched upper and lower limits on the same day. These and other market performance issues need to be considered in conjunction with the obvious constraints on speculation in the three markets. Such research might lead to speculative limits more responsive to the needs of markets.

Speculation on the Three Wheat Markets

The speculative indices for wheat, reported in Table 1, were based on aggregate positions in all three wheat markets, Kansas City, Chicago and Minneapolis. Minneapolis and especially Kansas City are preferred hedging markets for the hard wheats. They specify delivery of spring and hard winter wheats, respectively, in locations desirable for many hedging purposes. In the 1972-77 period reported long hedging averaged 87 percent of the open interest and short hedging averaged 86 percent in Kansas City. The comparable percentages in Minneapolis were 82 and 81 percent. Hedging in the Chicago market, on the other hand, averaged only 45 percent of the long open interest and 52 percent on the short side. The average month-end open interests were 194.7, 87.6, and 27.1 million bushels on the Chicago, Kansas City and Minneapolis markets, respectively. Thus, while more important in the composition of the

Kansas City and Minneapolis markets, aggregate hedging positions are largest in Chicago.

Estimates of the speculative index and the extent to which hedging may be viewed as offsetting or balancing are reported in Table 2 for the separate markets. In the pre-1972 period, Chicago was the most speculative of the three markets. In this period, the indices show there was some speculation at the Kansas City and Minneapolis markets above that minimally required to offset hedges. Previous research documented that a significant portion of speculation at Kansas City and Minneapolis was from traders who were willing to assume positions in those markets only when they simultaneously assumed offsetting positions in Chicago. Gray (1967) showed that the net positions of the reported spread traders showed a close correspondence to the net positions of the reported hedgers at both Kansas City and Minneapolis. This unbalanced spreading was in fact speculation from Chicago. The subsidiary markets survived only because necessary speculation could be transfused from another market.

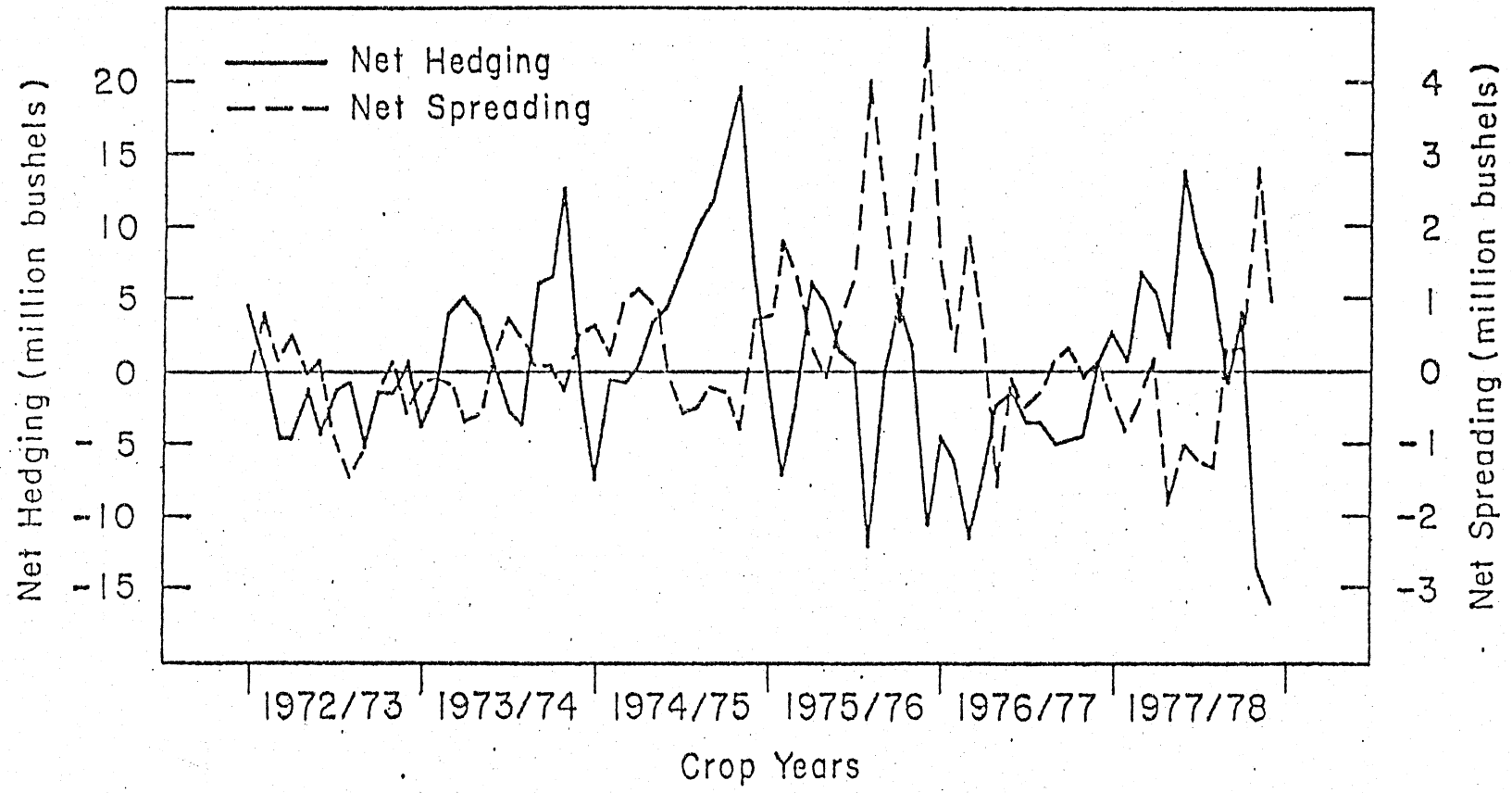
In the post-1972 period, the speculative indices on all three markets have decreased significantly, in spite of tremendous growth in each of the markets. The indices for Kansas City and Minneapolis are negligibly greater than minimal values. Significantly, the index at Chicago also has decreased to a value close to that of the two subsidiary markets in the earlier period. The Kansas City market is of particular interest in these comparisons and the relationship between hedging and net spreading at Kansas City in the post-1972 period is shown in Chart 1. As with Gray's results there is clearly a close

Table 2.--Measures of the Speculative Index (T) and Hedging Balance on the Three Wheat Futures Markets*

Market/ period	Lower bound estimates			Upper bound estimates		
	T	Offset hedging	Balanced hedging	T	Offset hedging	Balanced hedging
		Percent of open interest			Percent of open interest	
Chicago wheat						
1947-71	1.355 (0.261)	13.6	2.6	1.891 (0.536)	19.3	10.6
1972-77	1.094 (0.053)	41.4	22.0	1.323 (0.123)	50.6	42.2
Kansas City						
1947-71	1.081 (0.086)	43.8	29.3	1.264 (0.221)	56.2	49.6
1972-77	1.009 (0.008)	83.1	76.2	1.045 (0.026)	88.1	86.1
Minneapolis						
1947-71	1.056 (0.075)	50.7	36.3	1.230 (0.192)	64.7	60.0
1972-77	1.013 (0.010)	75.1	65.9	1.070 (0.047)	85.7	83.5

* Based on the monthly, reported positions data from the Commodity Futures Trading Commission (formerly Commodity Exchange Authority). Years are crop years. Standard deviations of T appear in parentheses. See text for a description of the upper and lower bound estimates.

Chart 1: Hedging - Spreading Relationship in Kansas City Wheat Futures, Monthly 1972 - 77



*Based on Data from CFTC, "Commitments of Traders", Monthly

inverse relationship with net spreading and net hedging. The significant difference from his earlier results is the magnitude of the response of spreaders to changes in net hedging. In the earlier period, the unbalanced spread positions were of the same order of magnitude as net hedging positions. More recently, changes in the net spread positions are approximately one-fifth those of the net hedge positions. The explanation of this change is most likely tripartite. First, Kansas City may have grown enough in the recent period to attract nearly sufficient speculation, thereby becoming less reliant upon Chicago for its needs. Second, the significant decline in speculation relative to hedging needs in Chicago suggests there is little remaining "excess" speculation in Chicago to respond to the needs of the subsidiary market. Thirdly, the aforementioned closer balance between short and long hedging provides more offsetting hedging. Kansas City continues to suffer from a lack of speculation, though the deficit is smaller now than in the past. In fact, all three wheat markets appear to have inadequate speculation.

In light of these results, a recent statement (Stone, p. 56) by the current chairman of the CFTC, who said "Relatively few markets fit the textbook description of a futures market: one in which most of the business is commercially oriented, with just enough speculation to provide the lubrication the system needs. One that does, for example, is the Kansas City wheat market. . ." can only be termed astonishing. Speculation at Kansas City is manifestly inadequate--an inadequacy which is manifest every day in spreading to Chicago. And while the spreading manifests the inadequacy, it does not measure it--its true measure would require knowing how much more price sacrifice

would be entailed in placing a trade at Kansas City absent the Chicago spread opportunity, in addition to the price sacrifice already encountered in the presence of the spread opportunity. If Chairman Stone finds so inadequate a market as that for Kansas City wheat to be so nearly ideal, why does he not exhume the markets for bran and shorts, which died there for lack of speculation?

Conclusion

The role of speculation in commodity futures markets is perhaps the least well understood economic activity. Its existence has been the source of much regulation, its abuses serve only to focus attention on our ignorance. The data assembled here attempt merely to refocus attention, providing a view of the speculative composition of a variety of markets. These data confirm the inadequacy of speculation on the tributary wheat markets and suggest its inadequacy in wheat, corn and soybeans generally. Coincidentally, speculation was most inadequate on those markets with the most restrictive position limits.

The diversity in speculative composition among markets suggests a variety of interesting, useful research needs. Are there detectable differences in price behavior among markets with significantly different speculative components or within markets where relative speculation has changed significantly over time? Is price behavior measurably different in the Kansas City wheat market, with its still inadequate speculation, than in Chicago? Has this difference changed over time? In markets characterized by barely adequate speculation and hence low speculative indices, much hedging is required to

be balancing, more than might be expected on a well-functioning, liquid market. Are the costs of hedging higher on these markets? Have higher costs altered significantly hedger's use of the markets?

Analysis of these market performance issues has not been attempted. Rather, the analysis documents pronounced differences in speculative adequacy among a variety of futures markets. That market performance research is needed is clear. Economic analysis which focused upon these questions could contribute both to our inadequate knowledge and, hopefully, to enlightened regulation.

FOOTNOTES

* The author is Associate Professor, Food Research Institute, Stanford University. Comments by Tom Hieronymus on an earlier paper stimulated the research reported here and comments by Roger Gray on an earlier version of this paper clarified these arguments. Their assistance is gratefully acknowledged.

1 Rutledge's method, when applied to current data, often resulted in negative hedging of speculative positions, reflecting the significant changes in market composition which have occurred since the period when the market surveys were taken. Rutledge's allocation model was reestimated with logs of ratios of the percentage distributions as dependent variables and the same set of independent variables. The estimated percentages are thus constrained to the (0,1) interval.

2 Both Rutledge and Larson included shifter variables in their equations for the different commodities included in the full market surveys, but these were not significant and were excluded in the final estimates. Also, the financial market surveys were not included in either Rutledge's or Larson's work and were hence excluded in the estimates used here.

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